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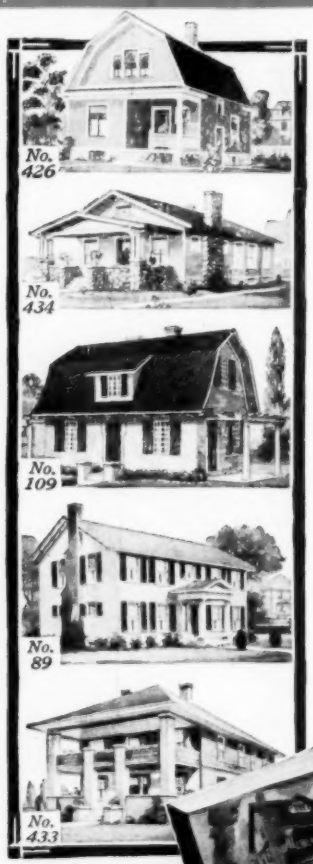
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

HARRIS HOMES



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Vol. 28 OCTOBER, 1917 No. 4

Human Sled Carries Wounded Man to Safety

FOR years the fine qualities of manhood and the striking efficiency characterizing the personnel of the Northwest Mounted Police have clothed that remarkable body with a most enviable reputation. Gradually the deep-chested guardians of our timber lands, the forest rangers, are earning a somewhat similar standing. The reason for this is well illustrated by an incident that occurred a few weeks ago on the upper slope of snow-covered Mount Hood. A guide had taken a party of men and women to the summit of the mountain. On the way down one member of the group, a woman, suddenly slipped. As she did so, the heel of one of her shoes struck the handle

While Holding the Wounded Guide in His Arms, the Lookout of Mount Hood was Dragged Down the Snow-Covered Slope for Two Miles. In This Heroic Way the Helpless Fellow was Assisted to a Point Where a Stretcher could be Procured. He was Then Carried to an Automobile Station

of an ax carried by the guide. The sharp instrument was hurled in such a way that it struck the man in the abdomen, wounding him dangerously.

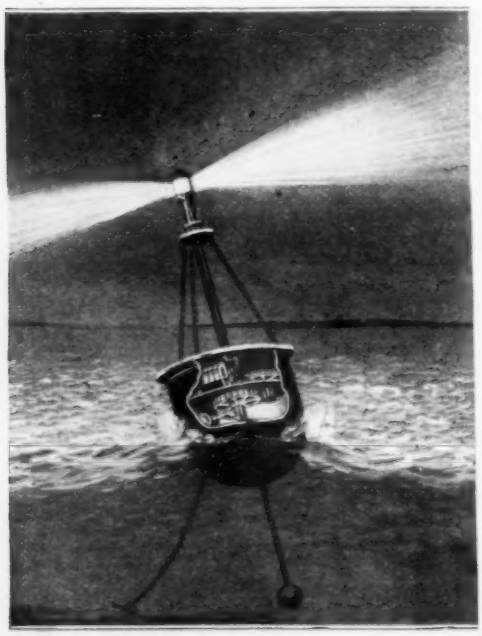
Far above, at the summit of the mountain, the Forest Service has a lookout. Watching the descending party through binoculars, he witnessed the accident. No one can tell how many minutes and seconds this fire hunter of Mount Hood spent in reaching the injured man who lay on the snow a mile below. He slid, coasted on his back, and virtually volplaned down the precipitous incline.

In a few moments he was at the guide's side administering first aid. That done, he lay flat on his back, pulled the injured man on top of him, and instructed the bewildered onlookers to tie a rope to his feet. Clasping the fellow in his arms, he gave the word to move ahead. The body of the nervy lookout was a human sled. He was dragged down the mountain for two miles to a point where a stretcher was available. From there the guide was carried to an automobile station.

The lookout of Mount Hood is Elijah Coalman, American.

NEW AUTOMATIC LIGHT BUOY MAKES OWN ELECTRICITY

Because an automatic light buoy designed by an inventor of marine apparatus produces its own electric current and demands only casual attention, the cost of maintaining it amounts to practically nothing. Its mechanism is not complicated. A vertical shaft mounted on ball bearings is actuated by a weighted horizontal arm that swings back and forth when the buoy is rocked by the waves. The motion is transmitted through gears to a high-tension magneto. Each time the weight swings either to the left or the right, the generator makes a few quick turns and develops a strong spark that passes through a gas-filled glass tube and produces a bright flash of light. Obviously the strength and frequency of the flashes increase as the sea grows rougher. The prismatic outer cylinder of the lamp is red, blue, or any desired color. There is no filament in the gas-filled tube.



Showing the General Appearance of the Buoy and the Character and Arrangement of Its Interior Mechanism

NEW DEVICE FOR PHONING FROM MOVING TRAINS

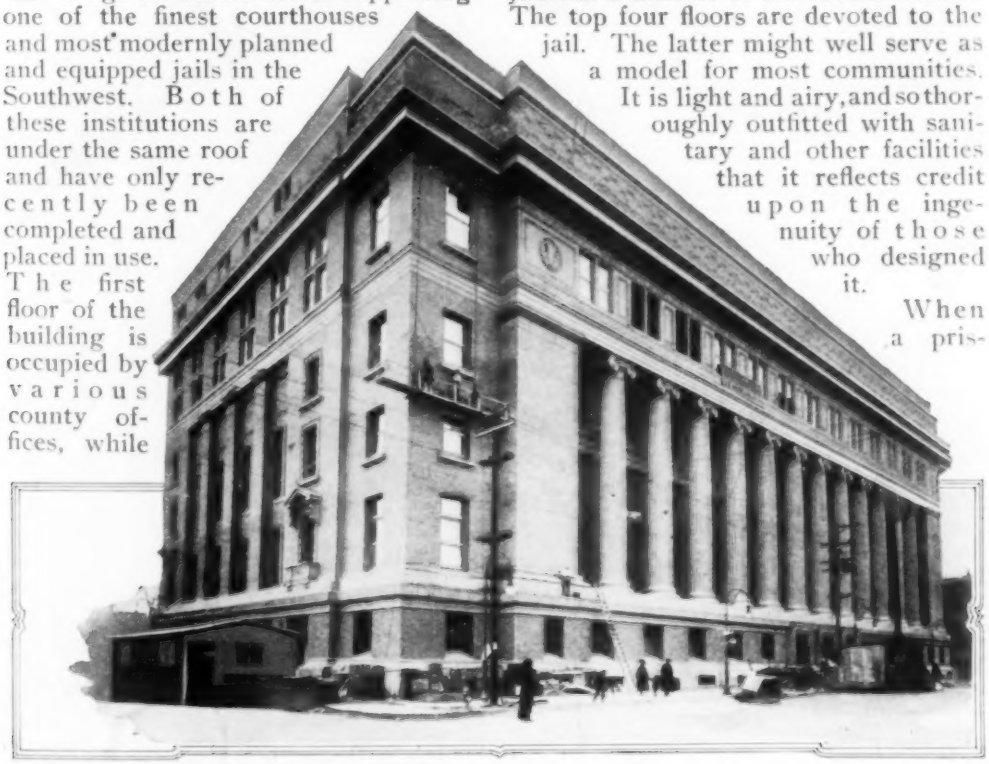
Telephone connection between a moving train and a dispatcher's office was established recently by employing apparatus with which transmission is made through the wheel and axle, without the assistance of any contributing medium. The demonstration of the equipment took place on a double-track line where the rails were properly bonded for the block-signal system, but it is claimed that the apparatus would work equally well on any track where the rails were similarly bonded without regard to the presence or absence of a block-signal installation. According to reports of the experiments, the communication established was satisfactory in every way.

One of the Steel "Sun Parlors" in Which Inmates of El Paso's New County Jail are Given a Chance to Exercise during Certain Hours Each Day When the Weather Permits

MODEL JAIL IS PROVIDED IN COUNTY BUILDING

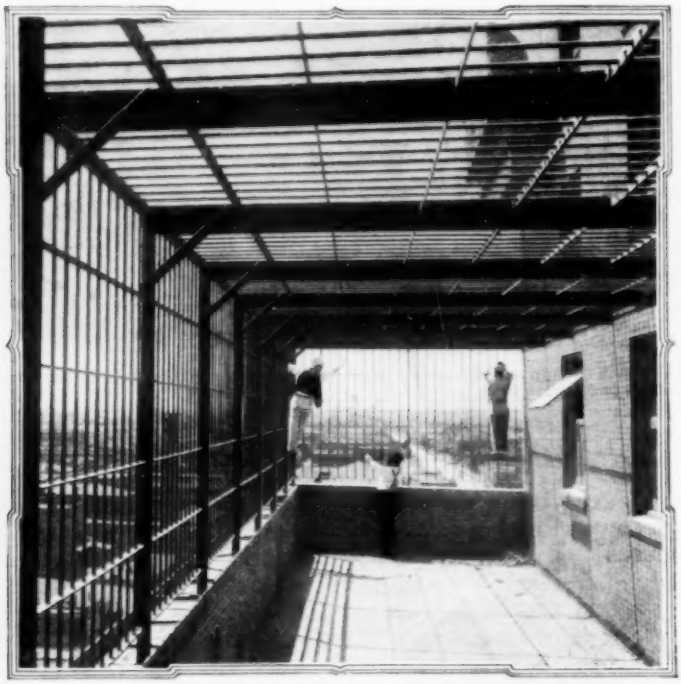
TO El Paso County in Texas belongs the distinction of supporting one of the finest courthouses and most modernly planned and equipped jails in the Southwest. Both of these institutions are under the same roof and have only recently been completed and placed in use. The first floor of the building is occupied by various county offices, while on the second and third floors are the judicial chambers of the several courts. The top four floors are devoted to the jail. The latter might well serve as a model for most communities. It is light and airy, and so thoroughly outfitted with sanitary and other facilities that it reflects credit upon the ingenuity of those who designed it.

When a pris-



Exterior View of Splendid County Building Recently Erected at El Paso, Texas: The Upper Floors of the Structure are Devoted to One of the Best-Equipped Jails in the Southwest

oner enters the place he is taken to a cell room in the basement where he is given a bath and clothed in a clean uniform. His own garments are thoroughly fumigated and stored in a steel locker where they are kept until he is released. The man is next subjected to a physical examination to preclude the chance of his spreading a contagious disease. Finally he is taken to the jail above in a two-compartment elevator, built so that it is impossible for the operator to be reached or the control of the car affected.



Interior of Barred Recreation Balcony: Equipped with Gymnasium Apparatus, It Gives Prisoners a Chance to Keep in Good Physical Condition While Incarcerated

The cells are arranged in segregated groups and may be locked or unlocked simultaneously from the corridors. The interior of each is finished in white enamel, equipped with porcelain toilet facilities, and supplied with hot and cold water. A shower bath is installed in each compartment to serve the occupants of the 10 cells inclosed. A chapel and small library are also maintained. At the present time there are about 300 cells, but space is available for the installation of as many more should they eventually be needed.

Outdoor cells, or caged porches, where gymnasium apparatus is installed, are among the unusual features of the institution. These spaces are large and airy and provide excellent opportunity for prisoners to exercise and enjoy the sun's rays. Inmates in good standing are allowed the privileges of these "roof gardens," as they are locally termed, for an hour each day. This enables them to keep in good physical and mental trim, although they are confined. Proper recreation has the additional advantage of improving the morale of prisoners.

Since the point has been strongly stressed by two correspondents, it seems entirely in place to mention that the prison "sun parlors" overlook the Rio Grande and afford an excellent view of the Mexican hills, and particularly of

Looking through the Doorway into One of the Mobile Padded Cells with Which the Jail is Supplied

the town of Juarez, twice captured by rebels during the insurrections of the last few years. One writer ventures: "In the event of another attack upon the place, they [the prisoners] will have grand-stand seats from which to witness the battle—and they won't have to pay for them." The latter phrase seems to be the important feature, for law-abiding citizens, it appears, have viewed the previous battles only after paying liberally for standing room on the roofs of El Paso's business buildings.

The equipment provided for imposing death penalties is somewhat unusual. The execution is accomplished without requiring the services of a hangman. A condemned man is bound in a chair so that he cannot free himself and a noose is placed around his neck. He is then left to his fate. The jailer locks the door of the chamber and from the outside sets a time clock which, through electric connections, releases the trap and ends the prisoner's life without the affair being witnessed.

El Paso County has a rather mixed population. For that reason the women's section of the jail is arranged so that white, Mexican, and negro girls and women may be segregated.

Mobile padded cells are used for violent and dangerously insane inmates. The heavy upholstering and soft-rubber matting in these cells may be removed, when desired, leaving a light portable cage. These are mounted on wheels and can be readily pushed from one place to another. There are various situations that arise in handling unbalanced persons that make cells of this type exceedingly serviceable. When such a prisoner is to be given an examination, medical or other treatment, or taken for an airing, one or two attendants can push the cell to different parts of the jail, or to the "roof garden," without difficulty or danger.

The new county building is attractive architecturally and structurally. It is built of steel and concrete and faced with light-colored brick, this construction eliminating firescapes.

PASTEBOARD SOLDIER BUILT TO AID CAMOUFLAGE

Papier-mâché soldiers may yet be used against the Germans. Camouflage, the art of fooling the enemy by disguising and concealing the implements of warfare, has brought about the development of a dummy soldier that defies binoculars. As is well known to those who are in touch with the trend of things at the front, field guns are made to look like broken tree trunks, and broken tree trunks are made to look like fields guns, all for the purpose of hampering the enemy's observers and misdirecting its gunners. In making stumps and old carts pass as artillery pieces it is necessary to provide inanimate gunners for the sake of appearances, hence this pasteboard soldier, the recent invention of an American student officer. As must be obvious, there are innumerable ways in which the dummy might be used to advantage.

Two Sammies, One of Flesh and Blood, the Other of Papier-Mâché Made to Fool the Enemy

RING WATCH IS NEWEST STYLE OF TIMEPIECE

The popularity of the easily accessible wrist watch was doubtless what inspired the production by Parisian jewelry designers of a ring watch. It consists of a tiny timepiece mounted on a finger ring and, if desired, embellished with precious stones. At a distance the little dial might be easily mistaken for a large stone setting.

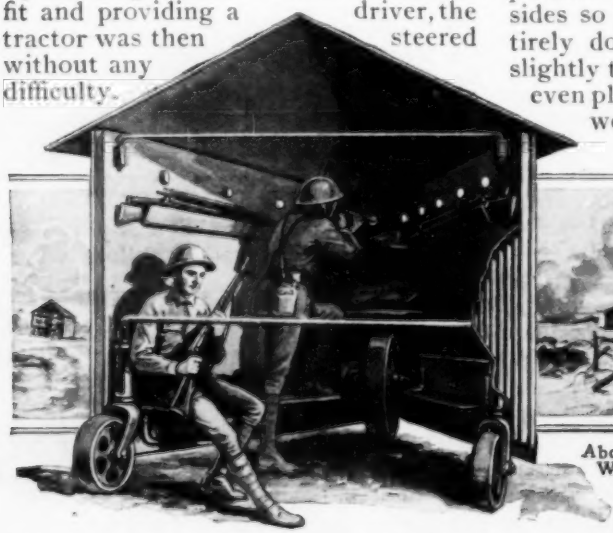
GOOD MAKESHIFT REPAIR OF CRIPPLED TRACTOR

When an agricultural implement breaks down in the midst of a busy season, a farmer usually finds some way of making a temporary repair that will permit its use until a new part can be obtained. For instance, the front hub of a three-wheeled tractor operated by a Canadian farmer broke at a time when the machine was badly needed. Instead of allowing it to remain idle for several weeks, he removed the crippled wheel and brought the fore truck of a wagon into use. A heavy plank was chained to the front end of the tractor's frame. A hole in the opposite end of the timber, which was rested on the wagon axle, accommodated a king-pin. By hitching a team of horses to the outfit and providing a driver, the tractor was then steered without any difficulty.

With the Fore Truck of a Wagon in Place, It Was an Easy Matter to Steer the Broken Tractor and Keep It at Work

STEEL SHIELD TO PROTECT ADVANCING SOLDIERS

No single instrument of destruction is playing a more vital rôle in the present war than the machine gun. To deprive Germany of this weapon by offsetting its effect is the purpose of an inventor who has developed a bullet-proof fighting shield that is perhaps worthy of study. The device is a wedge-shaped steel shelter mounted on one front and two rear wheels and intended to accommodate 10 infantrymen. The walls forming its two sides are 10 ft. long, 6 ft. high, 7 ft. apart at the extreme rear, and supplied with loopholes. They are surmounted by a detachable roof inclined to deflect shrapnel. The shield is designed to be folded flat and carried through the communication trenches to the firing line, where it could be assembled quickly under cover of darkness, ready to protect Sammies, Tommies, and Poilus during an early morning advance across "No Man's Land." A lever permits the vertical adjustment of the sides so that they can be dropped entirely down to the ground, or raised slightly to facilitate movement over uneven places. One of the contrivances would weigh about 1,750 pounds.



Showing the Interior Arrangement of the Fighting Shield and the Character of the Deflector Inserted between the Double Walls Forming the Sides

Above, the Artist Pictures a Squadron of the Wedge-Shaped Machines Going into Action, Protecting Infantrymen on Their Way across "No Man's Land"

The construction of the walls is interesting. The exterior surface consists of a sheet of

Diving into the Flaming Pool, a Nervy Swimmer Went to the Rescue of Three Helpless Children. He Swam Submerged to the Boat and by Splashing Vigorously Forced the Burning Gasoline into the Current

⅛-in. steel, while the inner one is of half that thickness. The space between the two amounts to about an inch and a half and accommodates a crimped lining of 1/16-in. material. The outer plate could be pierced by a bullet that struck it squarely, but the contention is that the saw-toothed inside lining would stop it, or at least prevent it from penetrating the third thickness. Projectiles fired from points within a certain angle on either side of the wedge, of course, would be deflected by the outer sheet. If equipped with a large number of these devices, soldiers would have a fair chance in the face of machine guns, the inventor claims, for they would be able to reach the enemy's trenches before exposing themselves to fire.

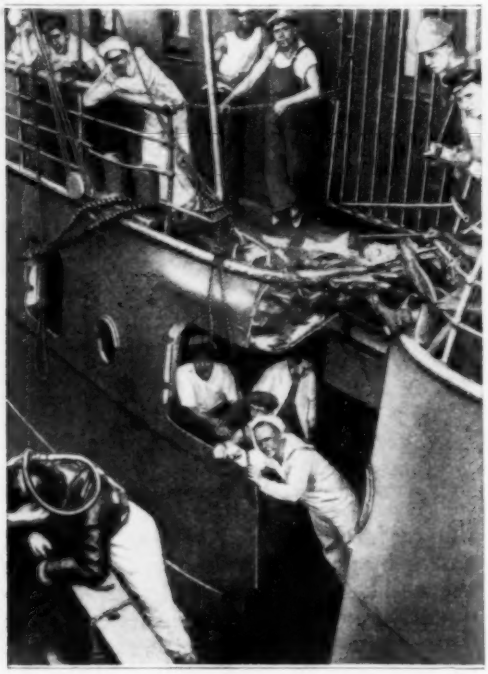
LEAPS INTO BLAZING POOL AND RESCUES CHILDREN

Three small children in an open launch encircled by blazing gasoline were saved from injury and possible death recently when a nervy young swimmer spectacularly went to their rescue. The owner had landed and left the craft unattended while he visited a near-by garage. When he was absent the children entered the boat. Subsequently several gallons of fuel exploded from some unknown cause, spread out on the water, and surrounded the launch, the flames imprisoning the children. Attracted by their screams, a quick-witted fellow ran to the water's edge. He remembered once having seen a circus performer plunge into a tank of water which was covered with a burning film of gasoline. He repeated the feat, diving deeply and swimming submerged to one side of the motorboat. As he came up he made a quick twist with his head and shoulders, splashing the water and breaking an opening in the burning film. By continued efforts he forced the flaming gasoline out into the stream, thus removing the danger and saving the children.

¶A new material used for sound-proofing the walls of a music-school building consists of seaweed chemically treated, fireproofed, and made into pads.

LOADED TRANSPORT RAMMED IN AMERICAN PORT

While lying at anchor in a certain domestic port a few weeks ago, the army transport "Saratoga," with a



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A Diver Descending to Determine the Extent of the "Saratoga's" Injuries: The Picture Shows the Hole Torn in the Port Side of the Transport by the Steamship "Panama"

regiment of Sammies aboard, was rammed by the government's liner "Panama," inbound from Colon with passengers. Although a large rent was torn in the port side of the former Ward Line steamer, no one was injured and the troops were quickly transferred to other vessels. The hole extended from below the water line to the rail, and before the "Saratoga" could reach a shipyard, it began to list and was beached. The only explanation of the accident is that there was a misunderstanding of signals in the engine room of the "Panama." The vessel was wending its way among a number of ships when the pilot saw that he could not clear the transport. He ordered full steam astern, but his signals were not obeyed and the crash resulted. The incident took place early in the afternoon on a perfectly clear day. The incoming liner was not injured, and proceeded to its pier.

STRENGTH OF DOUBLE-LOCK AND SHUTTLE STITCHES

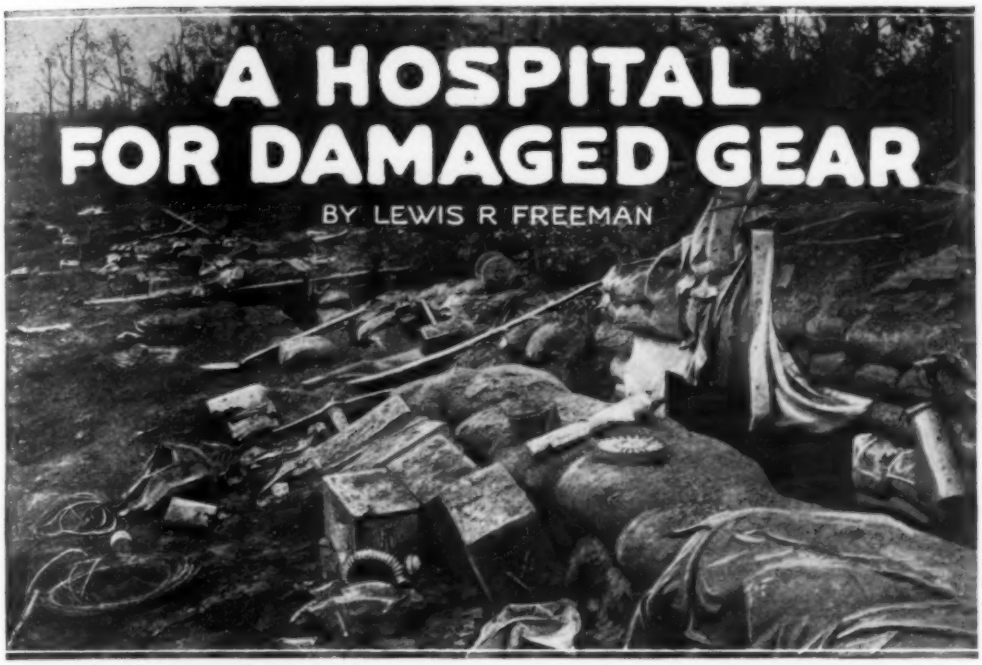
Accurate tests of the comparative strength of seams sewed with the double-lock stitch and the shuttle stitch, sometimes called the lock stitch, have recently been made by the Bureau of Standards at Washington. These two stitches are the ones most commonly used on sewing machines today. The shuttle stitch is produced by the use of a shuttle which supplies the under thread and involves the inconvenience of removing the bobbin from the shuttle from time to time to be refilled. The double-lock stitch is produced without a shuttle, all threads being fed directly from the original spools. In testing a variety of fabrics, sewed with threads of various sizes, it was found that seams made with the double-lock stitch were stronger than those made with the shuttle stitch and were less weakened by thread breaks. Other important factors relating to the merits of the two types of sewing machines, such as speed and cost of operation, were not considered in these tests.

DISCOVERY OF NEW POWER A BIG WAR SECRET?

Power transmission by a method which will revolutionize all existing systems has been discovered and is now largely used by the British war office and admiralty, according to a statement made by an engineer in a recent public address in India. Indian Engineering, in referring to this remarkable utterance, quotes the speaker as saying that "the whole output [of the new system of power transmission] is taken up for war purposes. After the war this system will be available; it will revolutionize all forms of power transmission and will be highly beneficial to rubber estates, tin mines, and to all power users."

A HOSPITAL FOR DAMAGED GEAR

BY LEWIS R FREEMAN



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Picks, Shovels, Broken Machine Guns, Gas Masks, Ammunition Cases, Wire, Canvas, and Other Discarded Articles Are Visible in This Picture of a Trench Left by an Advancing Regiment of Canadians

OVER the hospital for wounded soldiers floats the Red Cross flag, and over the camp for the treatment of wounded horses is the flag of the Blue Cross; the "hospital" for damaged gear bears no distinctive sign, but if one were to be chosen for it, perhaps nothing could be more fitting than the "Khaki Cross."

In wars of the past, and even down to the second year of the present war, battle-damaged and war-worn gear of all kinds—boots, caps, uniforms, saddles, harness, rifles, guns, etc.—went at once to the junk piles and bonfires, to be written off a nation's books as a part of the cost of the war. Even the canny and meticulously economical Japanese had no comprehensive system for salving damaged material, and I clearly recall seeing thousands of yens' worth of only slightly worn or torn accouterment being burned or

One of the British Salvaging Squads Bringing in Rifles and Other Equipment from "No Man's Land:" Repairs are Made at the Base "Hospital" for Damaged Gear, an Important and Highly Interesting Institution

This Official Panorama was Taken Following a Concerted British Advance on the Western Front. It Shows Place. As Pieces of Abandoned Equipment are Found, They are Placed in Way the British are Conserving Their

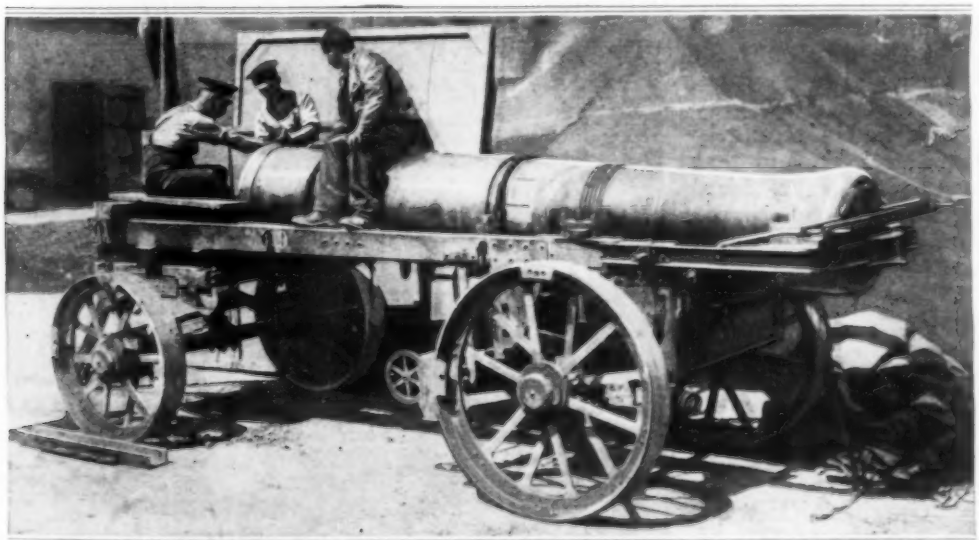
buried with the dead in lime-covered pits at Port Arthur. Even in the present struggle, the waste of material on both sides in the chaotic opening months was incalculable, and in this, as with munitions and so many other things, it is probable that the Germans were the first in the field to mimimize that loss. And the parallel may be carried still farther, for just as the slower but surer-moving British have finally overtaken and passed the Teuton in munitionment, so, also, have they developed a system for renewing or re-utilizing their damaged uniforms, boots, and other gear, as well as guns, rifles, and other arms, including, in some instances, material captured from the enemy, which is, at least, the equal of anything the vaunted efficiency and organizing talent of the Germans have put into execution. Perhaps nothing that one can see in all England—not even excepting one of the great new munition works—is more clearly and illuminatively indicative of the reserve of adaptability that has lurked—more or less unsuspected even by himself — behind the Briton's hitherto impenetrable mask of conservatism than the great "hospital" for damaged war gear "somewhere" back of the front in France.

Cobblers Working in the Open Air Repairing Worn Shoes That in the Past would have been Discarded: Such Work is Now Chiefly Done at the Main Repair Depot

The manner in which my attention was first

Troops in a Captured Village Clearing Away the Débris That Remained after the Terrific Bombardment of the Piles and Eventually Shipped to the "Hospital" for Renovation. In This Materials and Saving Millions of Dollars

called to the thoroughness with which the British are utilizing the "by-products of battle" was somewhat amusing—grimly amusing, of course, like all the funny things that befall in the shadow of Armageddon. In the course of a recent visit to the British front we—three journalists and the officers escorting us—spread our picnic lunch one day in a little garden on the back slope of a certain hill famed for the desperate fighting which took place there when the French regained it from the Germans, and for the fact that it is one of the most advantageously located observation points on either side of the western battle line. As the point was well within range of the intermittently thundering German guns, and as its usefulness as a lookout drew an ad-



Traveling Cannon Menders at Work: Equipped with a Well-Outfitted Mobile Workshop, These Expert Repairmen Rejuvenate Disabled Artillery Pieces near the Front. This Shows Them at Work on a Big Gun

monitory "Jack Johnson" every now and then, we, acting on orders, had brought the little knapsacks containing

Salvaging of War's Scrap Heap is Not Confined to the Western Front: Here Tommies are Sorting Turkish Rifles and Other Articles, Collected in Mesopotamia, Preparatory to Sending Them to the Repair Base

gas masks (they are one's inseparable companions all along the active part of the front), from the motor and laid them close at hand in case a questing shell chance along during lunch.

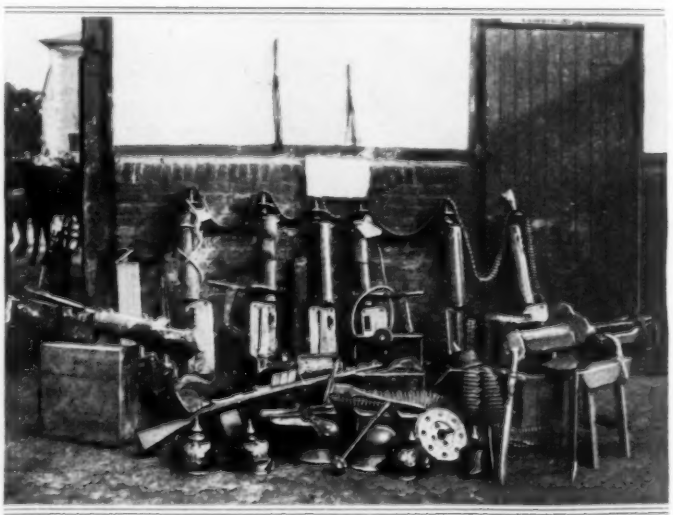
Unrolling my mask to read the directions for its use and to try it on, I noticed that the gray fabric had a strangely familiar look, and that one corner of the "skirt" of the queer contrivance was pieced out from a rounded seam.

"What's this stuff they use in the gas masks?" I asked of Captain R., who reclined at my elbow. "I'm sure I've seen something like it before."

"'Grayback,'" was the laconic reply. "I should hate to say anything to spoil your appetite, but if you must know, the flap of that mask you just had on was made from the tail of a Tommy's shirt picked up on the battle field. Possibly he thought he could chase Boches faster if he threw it away; possibly it was cut off him when a comrade applied 'first aid'; possibly—"

"That will do," I cut in, hastily rolling up the mask and returning it to its case. "Here's hoping no asphyxiating shells sail over today to force us to the dread alternative."

Captain R. smiled. "It really isn't as bad as it sounds," he said. "Of course, everything that is picked up is thoroughly disinfected, and the old 'grayback' flannel in that gas mask is as free from germs as aseptic gauze. So is everything else we send out of the 'repair shop' down at X——. You shall see this afternoon how we gather the 'damaged goods' from the battle field, and tomorrow you



Machine Guns, Rifles, and Helmets Captured by the British During an Advance in the West: They are Shipped to the Salvaging Station Where Something of Use is Made of Them

One Often Wonders What Disposition is Made of the Enormous Piles of Empty Artillery Shells That Accumulate. They are Carefully Collected and Re-Used. Piles Like This Form in a Few Hours

may see at X—— how we make them whole again. Nothing is thrown away nowadays. You couldn't have a better illustration than that gas mask of the system on which we work. Those pieces of flannel were doubtless no longer of use for shirting; saturated with chemicals, they are in every respect as good as new fabric for the skirts of masks or 'smoke helmets.'"

Among many absorbingly interesting things about the desperately fought-for conquered areas of the Somme, nothing impressed me more—in contrast with other battle fields I have known—than the way it had been "cleaned up," this applying no less to the "consolidated" trenches — in which Tommies were already snugly "keeping house"—than to those more open areas between the trenches where one usually forages for souvenirs. Of "dud" or unexploded shells and hand grenades, there were a number, but as to these, we were given unequivocal orders to give a wide berth; of innocuous fragments, even of rags, there was a singular dearth.

"It is because we have 'combed' the battle field for anything and everything that can be turned to some use again," explained R. "And there is little, indeed, even from the things the Boches left behind them, that cannot be made to serve in some way. Presently we shall go back and see the 'combings.'"

The advanced "combing station" chanced to be located right between what had been the original British and German trenches before the offensive of July 1, and but a few hundred paces from the crumbling ruins of obliterated Fricourt. It was nothing more or less than a couple of acres of level ground covered with orderly piles of disorderly fragments of every conceivable thing from pocketknives to field guns that figured in the life and activities of the British and German armies, gas helmets, flash lamps, oxygen apparatus for reviving those poisoned with gas, mess kits, rifles, hand grenades, boots, puttees, caps, belts, tunics, trousers, a thousand things, the mere cataloging of which filled pages of closely typed paper.

German and British articles were kept apart, and also the damaged and undamaged things, the latter to be redistributed at the front, the former to go back to the "base hospital" far in the rear. The "combers" were Tommies with bags and push carts, and

their duty was to go methodically over the conquered territory, as fast as it was cleared of the enemy, and bring in everything possible of renewing or working over into something else.

Such of this flotsam and jetsam of the battle field as is finally adjudged worth "doing over" is carted to one of the inconspicuous but ubiquitous spurs of light railway that are pushed up steadily behind every advance, and go by that to a "standard gauge" and thence to the waiting "wards" of the great "hospital" nearly a hundred miles away. This remarkable repair shop I was taken to visit the following day. Its "strategic" situation from an industrial standpoint is ideal, for not only is it in one of the best-served of French towns, but it has a railway and motor roads running directly into its busy yards.

This great plant at present employs something over 3,000 hands, about two-thirds of whom are French girls, and most of the remainder men of the British Army Service Corps. The girls are of the average factory type, quick with their hands and minds, but with no especial training. Their immediate "foremen" are English girls and women of a volunteer organization that has done important work in diverse fields of war endeavor. The men include many highly skilled workers, especially in the machine shops, for some of the repair work on such things as rifles and artillery demands quite as great a degree of technical training as does the making of such arms in the first place.

Of the work on arms, munitions, and kindred things, one is, of course, shown no more and told no more than if he were visiting an arsenal anywhere else. I was especially interested in learning to what extent material captured from the enemy is utilized, but this, naturally, is a question that would necessarily have to be answered with some reticence. Undoubtedly practically all of the captured material is used again in some form or other, but I gathered that no attempt is made to restore such things as German machine guns and artillery, even when ample munitions have been seized with them.

The work on boots, uniforms, and ordinary accouterment is as open to the inspection of the visitor as that in any factory. The work is as completely systematized as in any of the great manufacturing plants of the United States, and every stage of renewal is in the hands of a person who devotes himself to nothing else. The rapidity of the work is bewildering, especially to one not familiar with the manner in which enthusiastic and unselfish women workers have sped up the works in French and British munition factories since the outbreak of the war. Some of the transitions, both in their speed and completeness, are sheer wizardry, and the best way to get an idea of what is happening is to follow a "patient"—let us say a pair of boots—once water and blood-soaked, and later baked in the sun until they are nothing but shapeless masses of dried mud and leather, from the time of their "admission," through a few of their "treatments," to the moment they are "discharged" as fit for service again.

A preliminary steam bath accomplishes the double purpose of disinfecting and cleansing the boots (or uniform, shirt, puttees, or any other article of wear) sufficiently for an inspector to determine what repairs are required. Let us say that they need new soles, heels, and hobnails, and that the upper of one of them has been torn by barbed wire. The boots are passed along to men who, with a few deft nips with pincers, remove the worn portions of the soles and heels, before handing them on to a girl who rips off the piece of torn upper. A second or two later, a new piece of upper is being stitched into place on a machine which, like most of the others in this department, bears an American trade-mark. Half a minute later this boot has followed its mate into the hands of the solers where, after a brief interval of fitting, trimming, and preliminary nailing, another machine finishes that portion of the job. Even less time is consumed in heeling, and then both boots pass to a machine

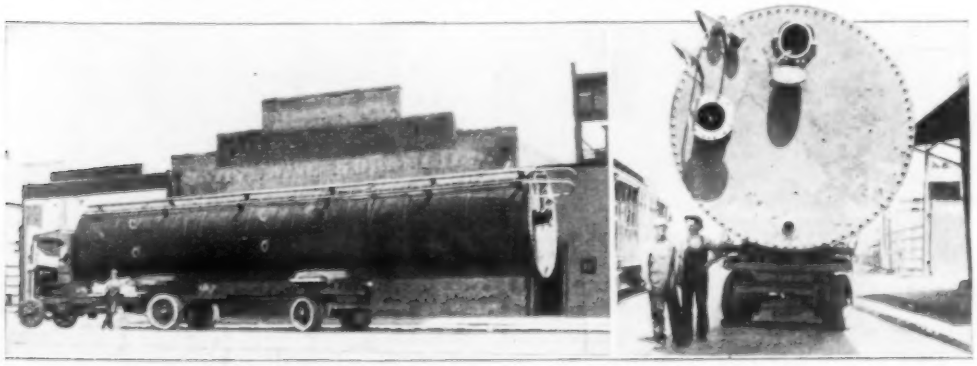
which begins pointing an accusing steel finger at its soles, with each gesture planting a rough-headed hobnail in place. Less than a minute is taken in completing the nailing job, and then, with scarcely five minutes elapsed since the beginning of the work, the repairs proper—work that would have taken an ordinary cobbler a couple of hours—are finished. A dip into a huge bath of warm cod-liver oil, a swift, deft kneading in the strong fingers of a singing French maid, a brief interval of rubbing, drying, and polishing, and those shapeless masses of caked mud and leather which we saw a few minutes ago are ready for their "discharge," a soft, durable pair of army boots that the experienced Tommy will pick every time in preference to those fresh from the factory. The work on uniforms, kit, gear, etc., is just as speedy, differing from that on boots only in the nature of the processes.

After what had occurred the day before at lunch, I was, not unnaturally, interested in the making of gas masks. In the long half-open shed where this work was going on I was shown stacks of chemical-saturated fragments of cloth which, on closer inspection, turned out to be pieces cut from shirts, tunics, blankets, and other things doubtless too much damaged themselves to warrant restoring as such. The masks were turned out with incredible rapidity. Pieces were cut to pattern from the chemically impregnated fabrics, stitched together, fitted with goggles and mouthpiece and laid out ready for wear almost as fast as one could follow them as they passed from hand to hand down the long benches. The girls sang as they worked, and at the completion of the last operation—the fitting of the exhaling valve—I noticed that most of them gave the rubber tube a vigorous smack with their lips, a salute to the Tommy who was expected to use it in the trenches. Rather a pretty way of cementing the entente, I thought.

TRUCK AND TRAILER CARRY TWENTY-ONE-TON LOAD

An extraordinary feat in big-load hauling was accomplished recently when a five-ton truck and a two-wheel trailer carried an oil agitator weighing 21 tons a distance of half a mile. A big hoisting derrick was secured to load the big cylinder, but it proved so heavy that finally three such derricks were required to get it in place. The carriers successfully moved their big load at about two miles an hour.

¶A 500-ton locomotive jib crane capable of lowering, raising, or swinging a 56-ton load at its maximum working radius of 87 ft., has been built for installation on the Panama Canal at Balboa. It is said to be the largest machine of its kind in the world.



Five-Ton Truck and Two-Wheel Trailer Carrying a Huge Oil Agitator Weighing 21 Tons: The Load was Transported Half a Mile without Mishap

HANDLESS MAN DRIVES CAR WITH MAGNETIC CONTROL

A handless man has recently driven an automobile across the continent. The feat was made possible by reason

Motorist with Artificial Hands Who Drove His Car across the Continent: A Feature Which Made the Automobile Easy to Operate Was the Magnetic Gear Shift

of the fact that his arm stumps were provided with apparatus to take the place of hands, and that the car which he drove was equipped with a magnetic gear shift. The long drive, which was undertaken to demonstrate the ease with which the car, so equipped, could be handled, was marked by no mishaps.

HINGED TOOTH SAFEGUARDS AGAINST DISEASE

A hinged false tooth has been invented by a dentist to take the place of ordinary bridge work in special cases. The tooth is divided into two parts, the base half being permanently

The Hinged Tooth, Which is Shown Both Open and Closed, Permits the Treatment of the Gums and of Adjoining Surfaces in a Way Which Ordinary Bridge Work Does Not

anchored in position close to the gum. To turn back the grinding or cutting part of the tooth, the wearer presses firmly against it with his finger, disengaging the two sections which interlock quite securely. In this way the sides of the adjoining teeth and the gum are exposed for treatment.

BUYING FOOD AND CLOTHES FOR NAVY A HUGE TASK

Some idea of how large a problem it is to feed and clothe the fighting forces of the United States in these war times can be gained from figures relating to the needs of our navy which now enrolls approximately 200,000 men. This branch of the service does not propose to lose its reputation of being "the best fed and the best clad navy in the world." For example, each month 5,500,000 lb. of meat must be provided for our sea forces, 4,854,000 lb. of flour, 8,700,000 lb. of vegetables, 620,000 lb. of butter, 1,678,000 lb. of sugar, 100,000 lb. of white navy beans, 624,000 lb. of evaporated milk, and so on. These supplies are purchased in various parts of the country where market conditions are favorable and then are assembled at the ports where they are needed to provision the ships and provide for the men training ashore.

Items relating to clothing for the navy are on an equally large scale, the totals being such that it is difficult for the average person to comprehend them. More than 100,000 men have enlisted in the navy and the naval reserves since war was declared, and to outfit them has required 200,000 overshirts, 200,000 pairs of blue trousers, 100,000 blue caps, 200,000 pairs of shoes, etc. The navy manufactures most of its uniforms in its own factories. The one at Charleston is being enlarged so that it will soon be able to turn out 200,000 suits of white clothing per month and the factory at the New York Navy Yard will soon be able to produce 70,000 blue uniforms per month.

¶ Plans are being worked out in California whereby at the end of the honey-gathering season bees will be transported to a new region where flowers are blooming to see if they will continue their work and thereby increase the output.

SPEED SCOUT SHOWS WAR'S EFFECT ON AIR CRAFT

Those who are interested in the war's influence upon aeronautics will find the accompanying photographs of a swift Nieuport scout machine worthy of study. They explain graphically the present trend in French designing and afford two exceptional views of a type of craft that is taking a vital part in the aerial activities along the western front. The most obvious change to be noticed in the structure of the Nieuport is, of course, its evolution from a monoplane to a biplane. This took place early in the conflict and has been generally known for two years at least. Technical interest will be found in the arrangement of the bracing wires and possibly also in the manner in which the struts are installed. Very little can be said regarding performance, for such details are not given general circulation. It is known, however, that the French are using speed scouts that are able to travel 175 miles or more an hour and climb at almost unbelievable rates. Incidentally it is rather interesting to note that the lines of the Nieuport bear quite a close resemblance to those of the Thomas-Morse aeroplane, an American-built craft. There is a marked difference between the two, however, in the struts and bracing wires.

¶A noninflammable, nonbreakable substitute for celluloid and glass is now being introduced in England for use in windshields, as an aeroplane-wing covering, for map-covers, etc. Its weight is about one-sixth that of glass.

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Close Views of a Nieuport Speed Scout during Its Inspection by an American Army Officer: At the Top is Shown the Nine-Cylinder Rotary Motor That Drives the Craft, While Below an Excellent Idea is Given of the Arrangement of the Struts and Bracing Wires

BATTLESHIP "LOUISIANA" MAKES UNUSUAL REPAIR WHILE AT SEA

WHILE returning from southern waters some time ago, the battleship "Louisiana" damaged the stern propeller off the coast of Virginia and was forced to send out a call for aid. The "Michigan" responded and subsequently assisted in executing a rather striking repair. Standing alongside and employing its powerful cranes, it lifted the stern of the crippled vessel out of the water so that the propeller could be reached and freed from the material that had fouled and damaged it. Several hours were consumed in the work, which was intently watched by seamen aboard both of the fighters. The operation was not only fairly difficult but, moreover, a delicate one, and was handled efficiently. It is rare, indeed, that repairs are made in this manner.

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WASHINGTON POLITICIANS STIRRED BY WAR STATUE

Comment was aroused in Washington some weeks ago when a clay model of a symbolic group intended to commemorate America's entrance into the world struggle was displayed on the floor of the House of Representatives. The work was executed by a former student of the late Augustus Saint-Gaudens and some congressmen expressed great surprise that the group did not create a more warlike impression, deploring the absence of uniformed soldiers, fiery steeds, and the usual military trappings, while others realized that the sculptress in working out her theme, "In the Cause of Humanity, Civilization, and Liberty," looked beyond the mere paraphernalia of war to symbolize the ideals that inspire our participation in the struggle for world democracy. In doing this she has shown an athletic young warrior with drawn sword stepping forward against the waves of tyranny, which lash the rock of Liberty on which he stands. Columbia, just behind him, points the way, while Civilization protects a young child, Humanity, who clings to her skirts.

Because of the Absence of Horses and Khaki Uniforms, Many Washington Politicians Thought This Symbolical Group a Queer Statue for Commemoration of America's Participation in the World War

HOW ENGLISHMEN'S MINDS ACT DURING AIR RAIDS

The Germans who have been repeatedly ordering air raids on the city of London in the belief that such "frightfulness," would tend to break down the courage and fighting spirit of the English, will find anything but satisfaction in an extended report on how the people of London have acted during the raids. This report, which appears in The Lancet, shows that, with very few exceptions, the inmates of 12 or more institutions for the sick displayed remarkable courage and self-possession when the enemy fliers appeared. Here and there are such comments as "Two girls cried," or "One patient hid under the bed," but for the most part it is a record of remarkable poise and calm, which indicates pretty clearly the splendid manner in which the English public is facing every phase of the war.

It is pointed out that the Zeppelin attacks have afforded an excellent chance to study the psychology of English crowds. The first instinct of the person who hears air raiders overhead is self-preservation. But in a great many instances, perhaps in the majority, curiosity overcomes fear. This accounts for the fact that people have been prone to swarm into the streets to watch the enemy above them when there has been grave danger of being killed. It is noted, too, that the spectators often take strange satisfaction in the excitement caused by a raid, apparently forgetful of the anguish and destruction which it may be causing. But the one thing which the Germans hope for most—a weakening of Englishmen's fighting spirit—certainly is not brought about by the depredations. Instead, each raid increases the determination to "see it through."

UNUSUAL WORK IS EXECUTED WITH FLEXIBLE CAMERA

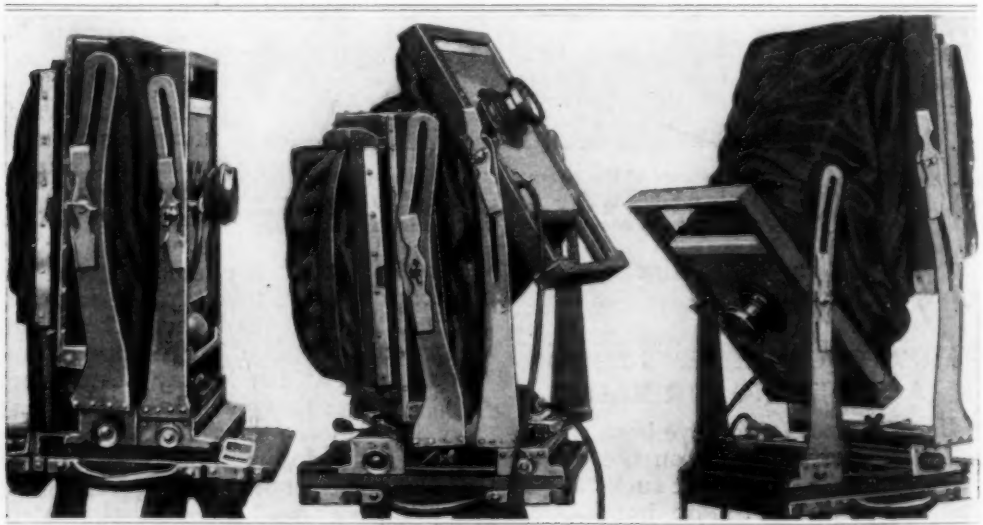
Results beyond the ordinary are claimed to be attained with a camera of great flexibility that has lately been

Although This Photograph of a Tall Hotel Building has Lost Much in Reduction and Reproduction, Its Sharpness Gives One an Impression of the Class of Work Accomplished by the New Camera

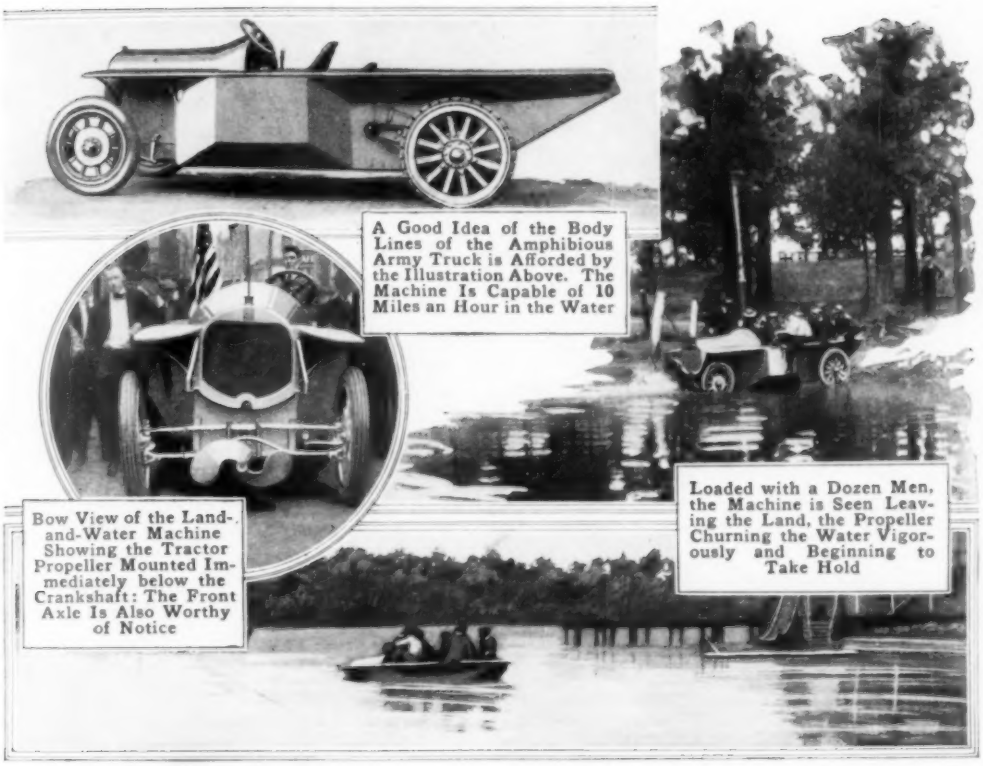
developed. Possibly the most surprising thing about it is its purported ability to photograph very tall objects, such as skyscrapers, at close range without producing objectionable distortions. Because of this feature, the instrument permits an operator to obtain perfectly focused, sharp pictures under conditions that would ordinarily render satisfactory work extremely difficult.

Without discussing the optical principles involved, a fair conception of the nature of the apparatus and its powers is offered by its structural characteristics. Both the lens and plate supports are independently adjustable to any desired vertical or horizontal angle. The bellows interposed between these members are supplied with spring supports, so that regardless of the relative positions assumed by the lens and plate, an unobstructed path is provided for the light. Unlike cameras that are supplied with rising and falling fronts, the lens of this one is always kept in line with the center of the plate when an exposure is made. For most work the latter is also held in an upright position, but may be turned sharply to one side or another.

The adjustments are supposed not only to allow the proper perspective to be obtained without distortion, but to bring all parts of a plate into focus. It is in this way that the image of a building some 400 ft. high, photographed at a distance of about 200 ft., is made almost as sharp at the apex as at the base.



Above, the Camera is Focused in Three Different Ways to Show Its Extreme Flexibility. In the Middle Picture It will be Observed That the Plate is Turned at an Angle and the Lens Elevated and Inclined


A Good Idea of the Body Lines of the Amphibious Army Truck is Afforded by the Illustration Above. The Machine Is Capable of 10 Miles an Hour in the Water
Bow View of the Land-and-Water Machine Showing the Tractor Propeller Mounted Immediately below the Crankshaft: The Front Axle Is Also Worthy of Notice
Loaded with a Dozen Men, the Machine is Seen Leaving the Land, the Propeller Churning the Water Vigorously and Beginning to Take Hold

The Front of the Engine Compartment is Sealed by a Steel Bulkhead so That Water can Not Enter through the Radiator. As may be Seen Above, the Car Serves Efficiently as a Motorboat When a Deep, Bridgeless Stream has to be Negotiated

Regardless of the character of work imposed upon the camera, it is never necessary to tilt the tripod. When, however, objects at the street surface, for instance, are to be photographed from high elevations, the plate support is inclined. The use of the instrument is not limited to photography of tall structures and similar work; it is equally serviceable for interior views, especially when space is cramped and handicaps are to be overcome.

NEW MILITARY MOTOR TRUCK IS AT HOME IN WATER

Amphibious automobiles are not altogether unfamiliar contrivances, but land-and-water motor trucks designed primarily for military purposes are far from usual. Such a machine has been developed, and there is reason to believe that it will in time see the battle fields of France. It has behaved well in recent tests and inspired considerable confidence in the minds of those who have seen it perform. While carrying a dozen passengers, the car has been driven into rivers and lakes and cruised the same as a motorboat. Its body, of course, is water-tight and of rather distinctive lines. At the front end a two-blade tractor propeller is mounted below the crankshaft. This pulls the machine through the water at a speed of about 10 miles an hour. To prevent leakage, the construction of the hood is obviously different from those of ordinary cars. A steel bulkhead seals the front of the engine compartment so that water cannot enter it by passing through the radiator. Broad horizontal planes extend along each side of the car. They prevent water from splashing into the tonneau or cockpit, and also act as mudguards. For scouting parties and

others operating in advance of an army, it is thought that the car should prove immensely useful, especially in view of the fact that the enemy in retiring, never leaves bridges standing.

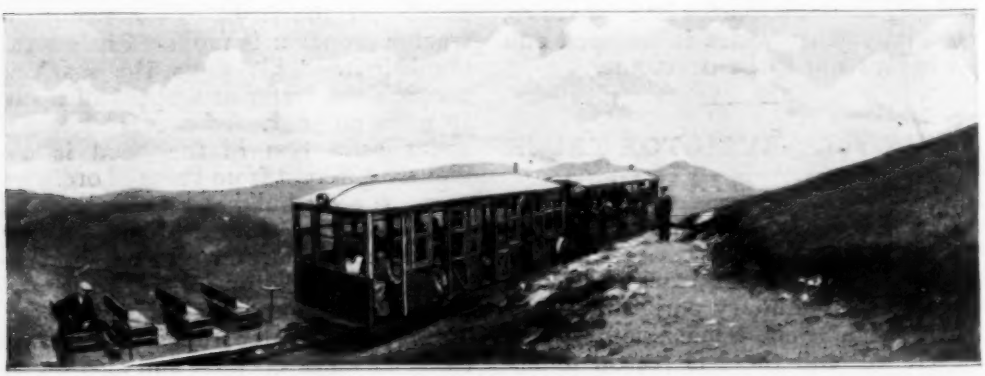
PLACE FOR TOOLS PROVIDED IN MOTOR-CAR TIRE RACK

Storage space for inner tubes, tire tools, and similar accessories, is provided in compartments occupying the space inside of a drum that is part of a tire holder lately introduced for motor cars. The device may be attached to one of the running boards of a machine, or at the rear. When used with a car that has a tool box installed elsewhere than beneath one of the seats, so that access may be gained conveniently, the storage compartments in the tire rack may be used for other purposes. They offer adequate room for the food supplies carried when one is touring, or for light motor wraps and raincoats.

Showing Interior of Upper Compartment Provided in Tire Rack for Storage of Tools

GASOLINE RAILROAD CARS USED ON MOUNTAIN LINE

Gasoline railway motor cars are being used to negotiate the heavy grades encountered in a Colorado scenic line between Silver Plume and the summit of Mount McClellan, the altitude of which is approximately the same as that of Pike's Peak. Each of the cars is driven by a six-cylinder, 150-hp. engine and carries 40 passengers in addition to a small trailer. They climb grades that vary from two to ten, and average six and a half per cent, traveling the route at speeds ranging from two to 20 miles an hour. The particular section of the road on which they are operated consists of 16 miles of track. Trains from Denver were formerly pulled from Silver Plume to the mountain top by a couple of special steam locomotives. It is these that the new motor cars replace. The narrow-gauge track rises several thousand feet by a zigzag series of steps, or switchbacks. At one point six tracks are visible, one above the other, extending up the side of the mountain.



The Gasoline Railroad Motor Cars and Trailer at the Summit of Mount McClellan

View of the Model Base Hospital Established on the Grounds of the Rockefeller Institute at New York: Here, under Near-War Conditions, American Surgeons will be Taught the Carrel-Dakin Treatment of Wounds

MODEL ARMY BASE HOSPITAL IS BUILT AT NEW YORK

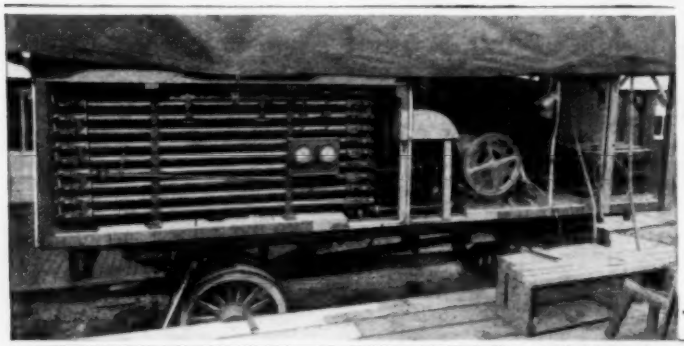
AMERICAN surgeons are to be taught the Carrel-Dakin method of treating wounds at a demonstration war hospital established on the grounds of the Rockefeller Institute in New York. Within the last few weeks a complete model base hospital, consisting of 15 buildings, of portable house-unit construction, has been erected, the purpose being to present to members of the medical and architectural professions a material example of the base hospital as it exists at its best on the western battle front. Those who receive instruction in the chemical sterilization of wounds will thus be trained under conditions as nearly analogous to those actually to be found in the war zone as can be provided. Furthermore, the plan makes possible the thorough testing of the unit portable hospital so that its merits and defects may be determined at home.

The structures are connected by covered passageways but except for this, each is entirely separate from the others. They are grouped in such a manner as to eliminate, so far as possible, all unnecessary work in handling patients. The administration building consists of a waiting room for visitors and offices for various functionaries. Adjoining it is the laboratory in which a demonstration and lecture room is provided. The receiving and discharging pavilion

Hinged Panels are Provided to Permit Speedy Evacuation of the Ward Buildings in Case of Fire. This Shows One of Them being Lowered

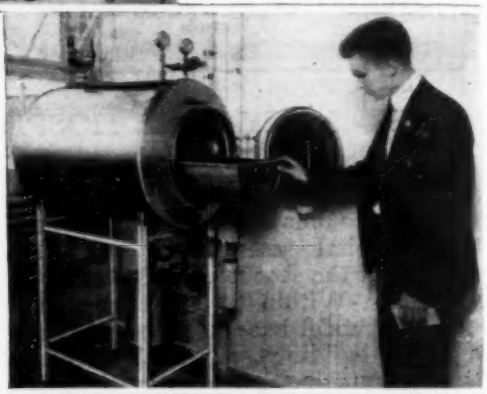
offers facilities for bathing patients as they arrive and dressing them in fresh hospital garments. Their own clothing is dispatched to the laundry and later maids, compose the rest of the buildings.

The structures have a number of interesting features. On each side of a ward, for instance, two panels are hinged at the bottom so that they may be swung out to permit quick evacuation of the building in the event of fire. Double walls and roofs are used. Also, the windows are designed to prevent drafts and avoid interference with the spacing of the beds.



The Mobile Ice-Making Machine Is One of the Valuable Pieces of Equipment Employed at Modern Base Hospitals

returned and stored until again needed. Immediately back of this structure is the operating pavilion, which is divided into various rooms. Two ward buildings each contain 24 beds and have a "quiet" room suitable for the accommodation of one patient. An isolation pavilion where contagious diseases developing after patients have been accepted, may be treated, is fitted with four beds. A recreation hall, mess hall, kitchen, laundry, supply house, and quarters for orderlies, nurses, and



The Demonstration Hospital at New York is Fully Outfitted with Modern Appliances.

Close View of Some of the Hospital Buildings, Which Are of Portable House-Unit Construction: It will be Observed That the Various Structures are Connected by Covered Passageways

Los Angeles' Great Aqueduct was Broken, as Shown Above, When an Earthquake Caused a Hillside to Slip and a Large Section of the Concrete Flume to Settle Six Feet

The lower sashes are fixed, while the upper ones are hinged at the bottom so as to swing inward.

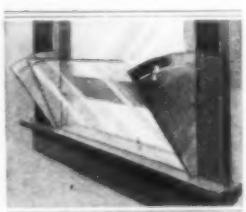
It will be understood that the buildings are constructed of portable units. These are 5 ft. in length, either 8 or 10 ft. in height, and in standard widths of 16, 22, and 28 ft. They are small enough to be readily handled and transported, and large enough for ample window space or double doors.

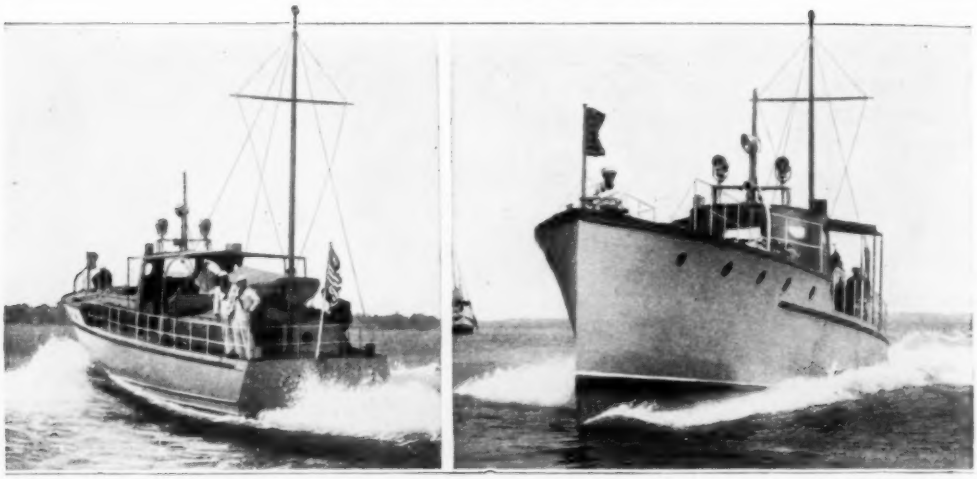
EARTHQUAKE AND LANDSLIDE BREAK AQUEDUCT

Quite a peculiar as well as a serious break occurred in the long aqueduct that supplies Los Angeles with water from the Owens River region. One hundred and sixty feet of concrete flume along the face of the Alhambra Hills was completely shattered. At first it was thought to be the work of alien enemies, but in reality it was due to a far different cause. An earthquake occurred in the Owens Valley district and in turn caused a landslide which wrecked the conduit. For many years there has been a small spring on the side of the hill some distance above the point where the aqueduct was broken. The whole slope, therefore, has been water-soaked. On the other hand, when a railway was projected along the base of the hill, a high embankment was established. In building it, earth was excavated at the bottom of the slope, thus weakening the support of the saturated mass above. The subterranean tremors readily caused a slide, and the waterway suffered. Temporary repairs were made quickly by bridging the gap with steel pipe. The permanent reconstruction of the section, however, will require considerable labor. It is understood that the hillside will be subdrained and that, at the base, provision will be made for supporting the earth against slipping. It is believed that in this way recurrence of the accident can be prevented.

DRAFT SHIELD FOR WINDOW MAY BE ADJUSTED

For office and residence windows, an adjustable draft deflector has been introduced. Except that it is so arranged that it may be set at different angles so as to conform to prevailing air currents, it is not unlike a similar device that has been in use for some time. The shield is adjusted by means of thumbscrews that slide in curved slots provided in the metal brackets that hold the glass in place.





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Dual-Service Boat, 66 Feet Long, Which the Government Recommends Yachtsmen to Copy in Building New Craft, so That in Case of Emergency Such Boats can be Requisitioned for Naval-Patrol Work

FAST BOAT FOR BOTH WAR AND PEACE SERVICE

The government has given yachtsmen an opportunity to render patriotic service by suggesting that new boats which they may order be constructed, where practical, according to specifications which the naval authorities have approved, so that in case of emergency the craft can be taken from peaceful cruising and utilized in offshore service in submarine warfare. A boat which meets these dual-service requirements has been constructed and put on exhibition. It is 66 ft. long, has a 13-ft. beam, and draws 4 ft. of water. It is equipped with three 200-hp., eight-cylinder engines which give it a speed of 28 miles per hour.

BUSH TWO CENTURIES OLD BOUGHT FOR GARDEN

It would seem that age—certainly the appearance of age—in a formal garden, can be bought just like garden furniture, fountains, etc. At least such has been the achievement of a wealthy owner of an estate who desired to give an appearance of great age to his newly laid-out grounds. One of the ways in which he obtained the desired effect was by purchasing a boxwood bush which is over 200 years old. For the privilege of acquiring this magnificent, hardy specimen which was planted a quarter of a century before Washington was born, the sum of $1,100 was paid. It stands 12 ft. high and measures from 19 to 21 ft. through its diameter.

Giant Boxwood Bush Over 200 Years Old, Which was Recently Set Out in a Garden to Help Give It an Appearance of Age

CITY PRESERVING PLANT CONSERVES FOOD

By O. J. GRIMES

WITH a view to preventing food waste at the municipal market, the women of Salt Lake City, with the assistance of the city commission, have established a preserving plant in connection with the market, designed to care for all left-over fruits and vegetables suitable for preservation. So far as it is known, this is the only institution of the kind in the United States.

Above Are Women Volunteers Preparing Their City's Surplus of Peas for Canning. At the Left Are the Finished Products Ready to be Sold Almost at Cost

All fresh fruits and vegetables unsold at the closing hour of the market each day are bought by the plant at prevailing market prices and preserved either in jars or by drying. The preserved products are offered for sale to the general public at prices slightly in excess of the actual cost of the raw materials and the jars.

To further encourage food conservation, patrons of the market may purchase the fruits and vegetables they desire preserved and deliver them to the plant where they will be preserved at a nominal cost.

Preserving Beets in Salt Lake City's Municipal Canning Plant in Which the Workers Are Women Who Donate a Certain Amount of Their Time Each Week

The capacity of the plant is approximately 150 jars of preserved products a day. Comparatively little has been done toward drying fruits and vegetables as yet, because the demand has been greater than the supply of products in jars. At the end of the first two weeks of operation, after many orders had been filled, there were 1,000 jars of fruits and vegetables on hand,

while the orders called for more than 1,500.

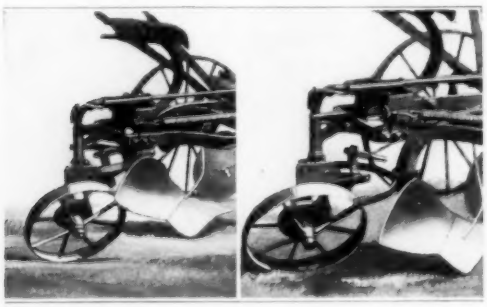
But the work does not stop with the actual preservation of the foodstuffs. Realizing that many women are not familiar with the processes of preserving foodstuffs, demonstrations are conducted daily by experts employed for that purpose by the city government. By this means it is expected that the movement for the conservation of foodstuffs will be carried into the homes. In addition to the demonstrations at the plant, there are demonstrations by volunteer workers at community centers throughout the city.

All work done by the women is without charge. The only paid workers are two experts employed by the city government. The idea of the municipal preserving plant originated with the women's committee on food conservation and this committee has arranged for a certain number of volunteer workers each day. In some instances a particular organization conducts the preserving operations, under the direction of the experts, on a certain day each week.

Besides furnishing the experts, the city provided the building and the equipment for the preserving plant and 10,000 glass jars. By making the charge for the preserved products slightly in excess of the cost of the raw materials and the jars, the women expect to reimburse the city by the close of the season.

NEW AUTOMATIC BRAKE FOR RIDING PLOW

An automatic brake has been invented which attaches to a riding plow

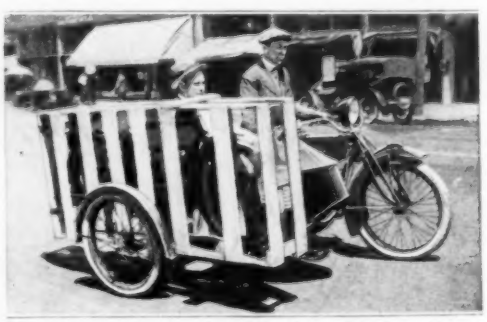


Two Views of an Automatic Brake on a Riding Plow: The One on the Left Shows the Plowshare Raised and the Brake Set; the Other Shows the Plow Lowered and the Brake Released

and serves to prevent the implement from running forward into the horses when the plowshare is lifted from the ground or when the plow is being drawn from field to field. A drum is fastened to the rear caster wheel and about it is placed a friction-brake band which is operated by a short lever. Attached to the plow beam, just above the blade, is a semicircular bar which extends backward either side of the caster wheel. Whenever the plowshare is raised this beam strikes the brake lever, causing the brake to operate.

SPECIAL AXLE INCREASES SIDECAR CAPACITY

By devising an adjustable axle for a sidecar, a motorcycle dealer has increased the carrying capacity of a machine materially. Besides accommodating a passenger in addition to the rider, the cycle is able to transport a crated machine at the same time. The latter is supported on a small platform arranged for the purpose and occupies the space provided between the sidecar and the outer wheel. Adjustment of the axle requires only a moment's time and is accomplished by loosening and tightening four bolts. When a



The Adjustable Axle Provides Space between the Sidecar and the Outer Wheel for a Small Platform on Which to Carry a Crated Motorcycle

new motorcycle requires immediate delivery this scheme proves valuable.

Receiving Instruction in a School Which Has No Entrance Requirements Save an Earnest Purpose to Become Efficient in Some Task or Trade: The Teaching is Done by Men and Women Who have been Successful in Their Respective Lines

OPPORTUNITY SCHOOL, DENVER EDUCATIONAL FEATURE

"MINUTE MAN" service is the keynote of the Opportunity Public School, conducted by the Denver school system for the benefit of those who never had a fair chance in life. There have been vocational schools, manual-training schools, trade schools, but the Opportunity School differs from all these. A man or woman, boy or girl, can secure, day by day, instruction there that will enable the student to hold down a new job. Or, one who has never been a student at the school may call upon it for instant help and receive it as readily as one of the regularly enrolled pupils. All instruction is given by men and women who are successful in the shops and stores of the city. Foremen and forewomen give several hours a day or night to guide the raw youth or the middle-aged misfit in a practical manner. Men and women over 60 years old are among the pupils. Twenty nationalities are represented among the foreign students.

The Opportunity School teaches automobile mechanics, Red Cross work, cooking, dietetics, bed-making and other domestic-science arts, salesmanship, hairdressing, manicuring, mechanical drafting, millinery, dental assistance, bookkeeping, stenography, and other practical, everyday work. Nearly every week some new class is started, and the number of pupils has increased steadily until now there are nearly two thousand enrolled. Most of these have jobs, and this fact makes the employment bureau of the school the most efficient in the city. The workers hear of vacancies before anyone else and are able to give information of openings before the employers themselves have time to advertise for help. Since the United States entered the great war the Opportunity School has developed several groups that constitute preparedness classes. There are both men's and women's automobile classes, where cars are taken down or assembled. The women don overalls and attack the cars with the same spirit displayed by the men.

The dietary course for nurses includes courses for feeding wounded men, as well as study of the proper diets for various contagious and non-

Learning to Buy and Sell: There Is a Decided Economic Gain to Denver in Having a Department in the School Where Young People can Fit Themselves for Positions in the City's Stores. This School Store was Furnished by the Manufacturers' Association

A Lesson in Manicuring in Which Modesty of Dress and Manner is Emphasized as Well as the Proper Care of the Hands: A Course of This Sort Helps Materially to Raise the Standards of the Trade

Teaching Girls to Be Competent Hairdressers: Heretofore Those Wishing to Enter This Line of Work Had No Place under Public Auspices Where They could Make a Beginning, and Their Instruction was Apt to be Obtained in a Very Unsystematic and Unsatisfactory Manner

A Women's Class in Automobile Mechanics: The War-Time Shortage of Male Workers in Mechanical Trades has Created Opportunities to Which the School has Responded by Teaching Women How to Assemble the Parts of a Motor Car

Learning to Become Dentists' Assistants: Alert Young Women being Taught the Names and Uses of Dentists' Instruments, How to Prepare Fillings, to Sterilize, and to Care for the Patients

Men Who are Proving Their Determination to Progress by Learning Trades after Work Hours: The School's Enrollment Includes Many Who are Rapidly Becoming Machinists, Chauffeurs, and Ambulance Drivers. Some will Seek Positions in the New National Army

contagious diseases. The Red Cross section is under a trained nurse, and here even such a simple thing as bed-making is taught. A first-aid course is included. The domestic-science classes are now reaching into food values and substitutes for the more common articles of diet. Practical workers in electricity are trained in a course laid out by the local electric-light company, and would be a valuable aid in trench warfare and wire-entanglement work.

Probably the most unusual class in public-school work is that in which hair-dressing and manicuring are taught. The girls are instructed that the first and most important thing to learn is self-respect for themselves and their trade. Vulgar talk, loud dressing, and the use of cosmetics are forbidden. The instructor, the head of the largest Denver beauty parlor, tells her pupils that the big parlors want wholesome girls.

Perhaps the most remarkable thing about this unusual public school is the fact that its head and inspiring genius is a woman. Miss Emily Griffith, the principal, was a poor farm girl, who began to teach when 14 years old. Her sympathy and quick perception have contributed as much as any other factor in making the school a success.

OFFICER DIRECTS TRAFFIC FROM RAISED PLATFORM

A small platform, 2½ ft. above the ground, has been erected by the side of a corner telephone post at an important street intersection in a large city, for use by the traffic officer. It is surrounded by an iron railing, and a circular awning shelters the occupant from the sun's rays. From this elevated position a policeman may obtain a clear view of the streets in both directions, and so can tell when to operate the levers which control the green and red semaphore signals in the center of the street.

BIG CATCHES OF CRAWFISH MADE WITH MOUSETRAPS

Mousetraps are being employed with great success in catching crawfish, which are sold by the owner of the traps at an excellent profit. The man engaged in this unusual sort of trapping finds that the creatures which swarm the quiet places in a near-by stream are not at all particular about the bait offered them, so that catching them is quite an easy matter. The trapper places a large number of the little spring mechanisms in well-selected places in the river and is kept busy a good part of the day removing his catches and attaching new bait.

FIREPROOF PHONOGRAPHS FOR ARMY AND NAVY

A limited number of phonographs which will withstand the roughest usage have been manufactured for the army and navy, and already certain military units have been provided with them. The machine furnished is 23 in. high, 19 in. wide, and 23 in. deep, and weighs 100 lb. The excessive weight is due to the outer case which is water and fireproof and is reinforced so that it may be thrown into an army wagon or ship's hold without being injured. The instrument is designed especially for outdoor use and can be heard distinctly at 200 yards.

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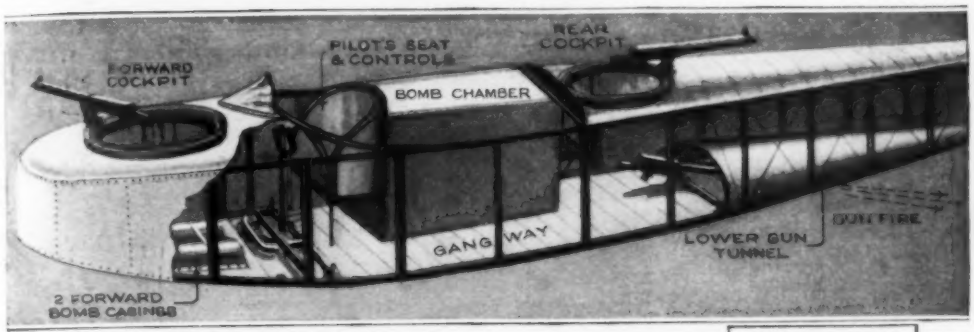

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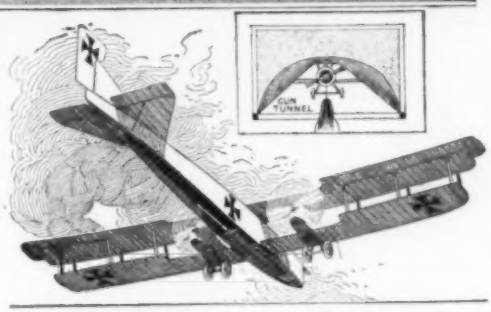
Showing the Interior Arrangement of the Fuselage of One of Germany's Big Gotha Battleplanes: The Plan Is an Entirely New and a Very Advantageous One

BIG GERMAN BATTLEPLANE SPLENDIDLY DESIGNED

Considerable attention is being paid to Germany's newest aeroplane, the dual-motored Gotha, which was well represented in the great aerial raid upon London in July. The machine is known as a bombing battleplane and has a wing spread of 78 ft., which, for comparison, is more than three times as great as that of the famous Nieuport speed scout used by the French and British. Aside from its size, which enables it to carry a pilot, two gunners, and more than 800 lb. of bombs, its outstanding features are found in the arrangement of the fuselage. The driver's seat is on the right side of the body, and immediately back of it is the bomb chamber. Extending along the side of these and separating them from the opposite wall of the fuselage is a gangway that connects the forward cockpit, or gun position, with the rear one. Behind the latter cockpit the bottom of the fuselage is arched to form a tunnel that gives the gunner an unobstructed view of the front part of a pursuing craft in the same horizontal plane. This removes the last remaining "blind spot" from the military aeroplane and gives the Gotha an advantage over adversaries. Two rifles are mounted in the rear cockpit. One commands the gun tunnel, while the other is carried in the usual position. The gangway makes it possible for a wounded gunner to be replaced by his associate, and



Inset, Looking through the Gun Tunnel at a Pursuing Plane; the Other Drawing Shows a Gotha Machine and Its Arched Fuselage

also enables both marksmen to man the stern guns in the event of a hot pursuit. The Gotha carries fourteen 60-lb. bombs, 12 of which are held in horizontal racks provided in the compartment behind the pilot's seat. The other two are contained in casings installed in the floor of the forward cockpit. Two Mercedes motors that develop a total of 520 hp., drive pusher propellers, and are mounted on opposite sides of the body.

MONUMENT COMMEMORATES FORTITUDE OF PIONEERS

Bronze casts are now being made for a splendid monument which will be unveiled next June at Donner Lake, three miles west of Truckee, Calif., on the spot where a group of pioneers, known as the Donner party, was caught by mountain snowstorms in 1846 and compelled to halt for the winter. During the months of cold and privation that preceded the coming of spring, 32 of the party perished. Of those who survived, six are still living. The statue, which commemorates the

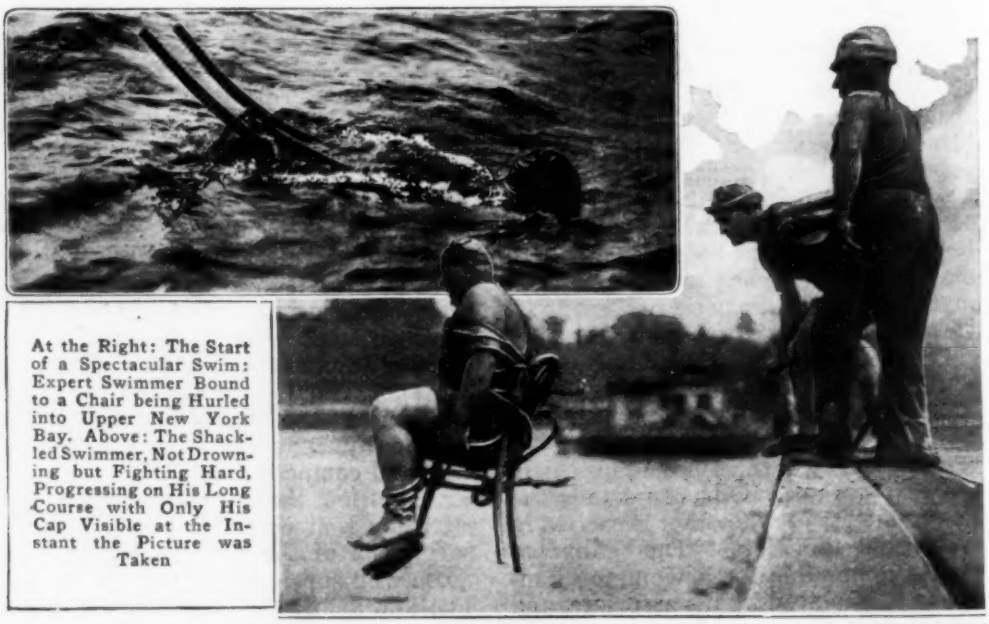
tragic episode and the heroism of those who shared in it, will stand 16 ft. high on a base 22 ft. high and will cost

Model of Statue to be Erected near Truckee, California, on the Spot Where the Donner Party of Pioneers was Forced to Make Camp for the Winter in 1846. Thirty-Two of the Party Perished from Privation

$30,000. It represents a pioneer and his wife with a babe in her arms, peering with great anxiety into the distance. A second child kneels wearily at his father's feet. Base inscriptions will give a brief history of the Donner party.

MAN SWIMS MANY MILES TIED TO A CHAIR

Not long ago the attention of spectators on the shore at Bay Ridge, Long Island, was attracted to a man clad in a bathing suit who had been securely shackled with ropes to a chair. Presently he was lifted by his companions and hurled into the water, still tied to the chair. Thus began a spectacular swim from Bay Ridge to the Battery, some five miles distant. In spite of the unusual handicap the swimmer, who was an expert, made steady progress. Much of the time only two chair legs and a rubber bathing cap remained above the water to indicate that the struggle was continuing. Three hours and 20 minutes after he had been hurled into the bay the swimmer reached the Battery and was showered with congratulations by friends who had gathered to witness the remarkable feat.



At the Right: The Start of a Spectacular Swim: Expert Swimmer Bound to a Chair being Hurled into Upper New York Bay. Above: The Shackled Swimmer, Not Drowning but Fighting Hard, Progressing on His Long Course with Only His Cap Visible at the Instant the Picture was Taken

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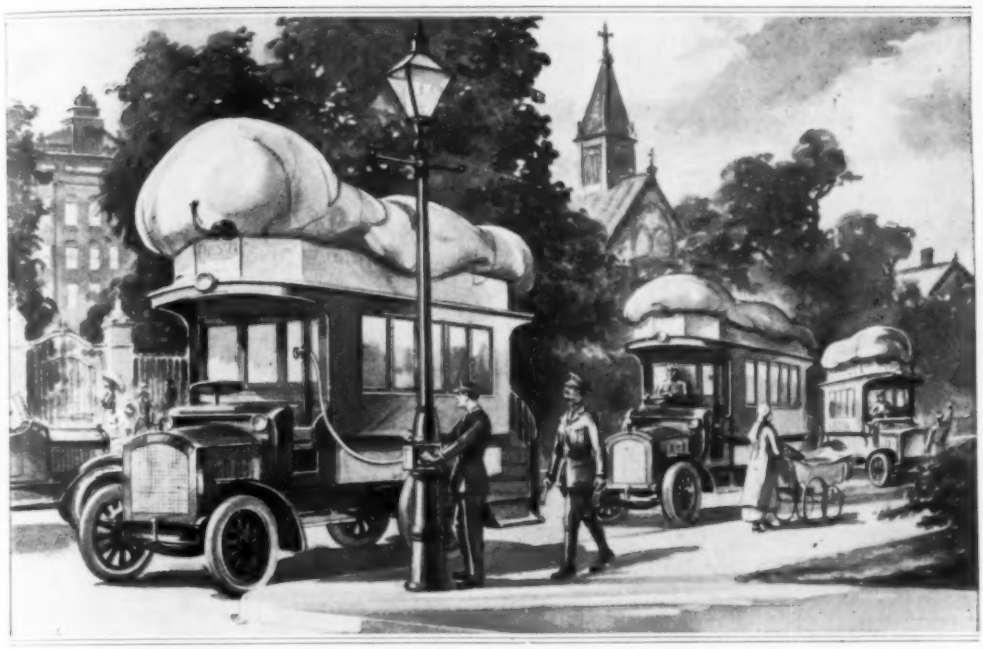


Inflating the Gas Bag at a Filling Station: London Motor Busses Operating between the City and Its Suburbs are Said to Use Illuminating Gas Instead of Gasoline for Fuel

ILLUMINATING GAS IS FUEL FOR LONDON BUSSES

According to reports that have lately reached America, the shortage of gasoline and methyl alcohol in Europe and the vital necessity of conserving the available supply for military purposes have brought about the use of illuminating gas as a fuel for motor busses operating between London and some of its suburbs. Bags that resemble small captive balloons are anchored to the tops of the big cars and inflated by pumps at filling stations that have been established along the routes of travel. Certain of these are understood to be merely lamp-posts conveniently situated at the curbs. The plan obviously has necessitated certain mechanical changes in the engines which, at least, involve the carburetors, besides the feeding and compression systems. The amount of power obtained from the lighting gas depends upon a number of things, and a reliable estimate could not be made without more detailed information than is at hand. It is also not altogether clear why unwieldy bags are being used instead of compact steel cylinders which could carry gas under high pressure. Although, at first thought, it seems that there might be danger of accidental ignition, this is undoubtedly avoided by providing fireproof covers for the bags.

BROKEN STEEPLE POINT SHOWN IN MID-AIR

A very unusual photograph, showing a wholly detached section of a 205-ft. church spire as it was falling to earth, was obtained recently while the wreckers were demolishing an old church in Columbus, Ohio. When work had begun on razing the edifice it was found that the framework of the upper part of the steeple was composed of 8-in. hewn oak timbers which converged at a point 30 ft. from the top. It was decided to cut off the spire at this point, and after it had been steadied by block and tackle the timbers were sawed through. The upper end was then pulled over with guy ropes hitched to a heavy truck in the

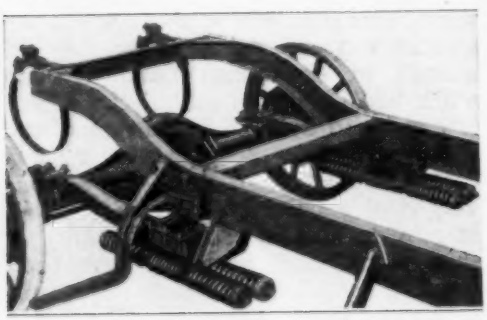
street below. In the fall the big fragment turned a complete somersault

Unusual Photograph Taken at the Instant the Point of This 205-Foot Church Spire was Toppling to the Ground

and landed in the auditorium of the church, which had already been made roofless.

MOTOR CAR'S LOAD CARRIED BY HORIZONTAL SPRINGS

Among the new suspension systems that have been devised for motor cars, there is one which employs the cantilever principle in combination with horizontal coil springs. The purpose is to absorb road shocks by indirect means so that no vertical movement will be transmitted to the frame or body of a machine. It is claimed that this is accomplished and that no rebound, recoil, or side sway is caused when the wheels strike ordinary obstructions. Laminated levers are clamped solidly to the axles and connected with the frame through large bearings. This permits free movement at the axle end without vertical shocks being imparted to the chassis. Oscillation of the levers operates coil springs held over horizontal rods carried by brackets suspended from the frame and box clamps of the bearings. Sufficient initial compression is applied to keep the springs under slight tension all of the time.



Indirect Suspension is Said to Obviate the Rebound and Side Sway Produced by Ordinary Springs When Compressed by Road Bumps

ABYSSINIAN POTASH MINE BEING DEVELOPED

It now seems probable that a rich deposit of potash, said to resemble that at Stassfurt, Germany, which was discovered a few years ago on the boundary between Abyssinia and Eritrea in eastern Africa, will soon be made more accessible to the world. This valuable property is located about 46 miles from the Red Sea, and while a company has been working it more or less extensively since the outbreak of the war in 1914, it has been handicapped by having to send the potash to the coast by camels and thence by boat to near-by seaports where it is transferred to larger vessels.

Owing to the value of potash for munitions, a contract was let some months ago for the construction of a railway from the coast to the mine to facilitate transportation. The grading of this line has been completed and rolling stock has been ordered, but the track has not been laid, according to recent reports. Difficulties have arisen in recent weeks in the matter of steamer transportation and the operation of the mine, but in spite of these delays, it is believed that large shipments from this deposit will soon be made to various countries. There is some thought of establishing direct steamship communication with the United States.

GAY AUTUMN TOGS FOR OUTDOOR ACTIVITIES

This Smart Street Suit of White Jersey Trimmed with Navy Blue Is the Very Essence of Mode Achieved by Simple Lines and Restraint of Ornamentation

Good Golf Is Impossible if One is Distracted by Ill-Fitting Garments. This Costume Is Graceful and Light, Yet Warm Enough for Crisp Fall Mornings

For Target Shooting the Skirt and Blouse Presented Above Are Particularly Suitable. One of the Three Pockets Is Removable; the Other Two Are Patch. The Costume was Designed and is Worn by One of the Country's Expert Woman Rifle Shots

The Gardening Frock of This Little Swing Girl Suggests Musical Comedy, a Spot Light, and a Sentimental Song. As a Morning Dress, However, in Pink Chambray Trimmed with Flowered Cretonne It Has a Delectable Freshness Wholly Girlish. The Bonnet to Match, Completes the Picture

Common-Sense Designing Is the Outstanding Feature of the Khaki Walking Garb Illustrated Above. It is Not Intended for the Girl of Mincing Steps, but for the Young Woman of Red Blood and Energy Who Really Knows How to Walk. Rain and Dust, Obviously, can Not Injure the Suit

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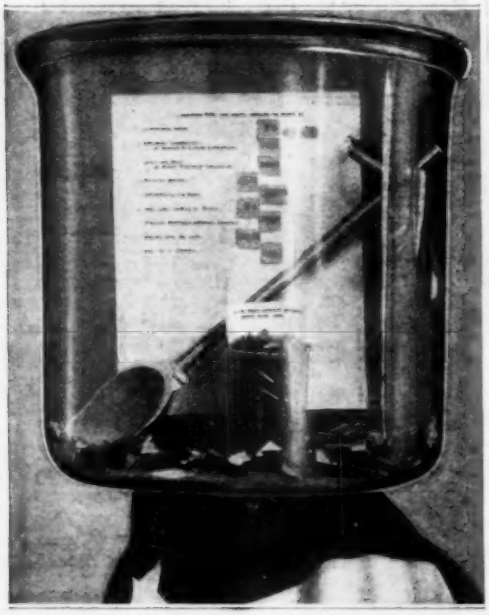
PLACE ARMY-DRAFT BOWL NEAR LIBERTY BELL

The army-draft bowl used recently in Washington, together with sample capsules and numbers, and the spoon



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Draft Bowl, Capsules and Numbers, and the Spoon Used in Stirring Them, Which are to be Placed near the Liberty Bell, in Independence Hall

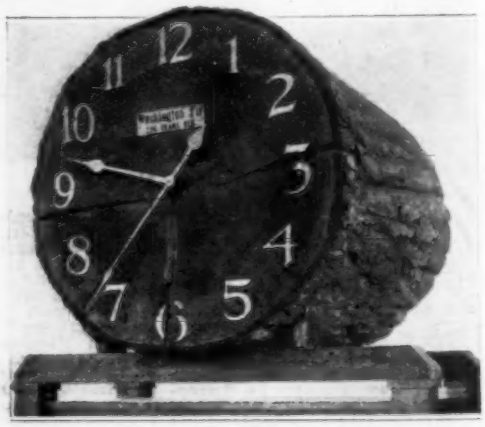
used to stir them, will be placed near the Liberty Bell in Independence Hall, Philadelphia, as a new memorial of America's love of liberty. The bowl contains a tumbler filled with capsules as they appeared before being opened, while about the tumbler are several numbers and opened containers. On a placard is a list of the officials who began the lottery and the numbers they drew.

CLAIMS TO KNOW SECRET OF HARDENING COPPER

Not content with the claims of other researchers in the deeply interesting subject of how to harden copper, nor discouraged by the many failures of others, an inventor of advanced years maintains that he has rediscovered this lost art and offers as one proof a balance spring in his watch, which he says is of copper hardened by his process. While the merits of this product cannot be vouched for, it is said that a number of concerns are using the alloy. "Hardened copper is not pure copper," the inventor is quoted as saying, "as it is impossible to temper copper as one tempers steel. My copper alloy, which is physically identical with the best brass of the ancients, will take a keen edge and will hold it under some conditions where steel cannot. Analytical chemistry will not disclose the nature of the constituents that give my hardened copper its peculiar properties. The alloy can be remelted any number of times without parting with any of its distinctive characteristics. In other words, once hardened, copper is always so."

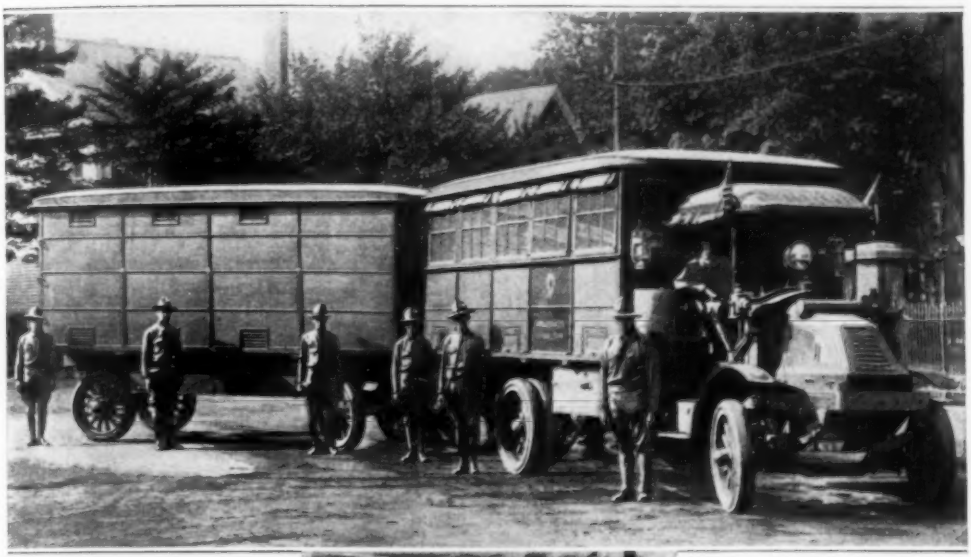
FIR LOG MAKES RUSTIC TIMEPIECE

A short, partly hollow log, cut from a fir tree 226 years old, has been made into a clock and serves as a novel adornment for the exhibition rooms of a manufacturers' association. One end of the log is used as the dial of the timepiece, the figures being painted on it. The hands are connected with the works by a rod which penetrates the center of the face. The clock has rendered excellent service for a number of years.

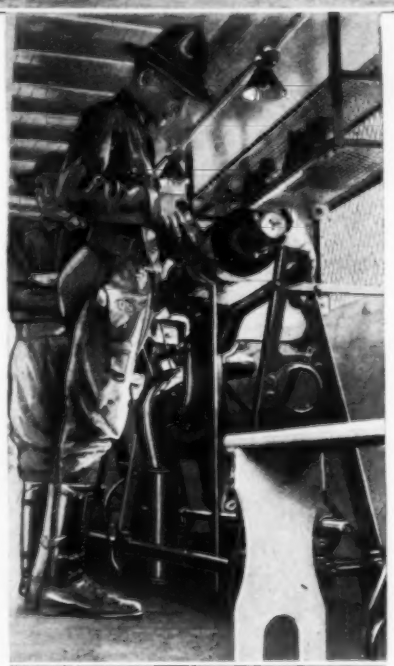


Log Cut from a 226-Year-Old Fir Tree Which has been Transformed into a Very Serviceable Timepiece

ARMY'S SHOE-REPAIR SHOP IN TRUCK AND TRAILER



Truck Equipped with Machinery for Repairing Army Shoes and a Trailer Containing Supplies and Bunks for the Crew which is Composed of Six Skilled Workers and the Driver: The Machinery Includes a Lock-Stitch Sewer, a Nailer, and Apparatus for Finishing



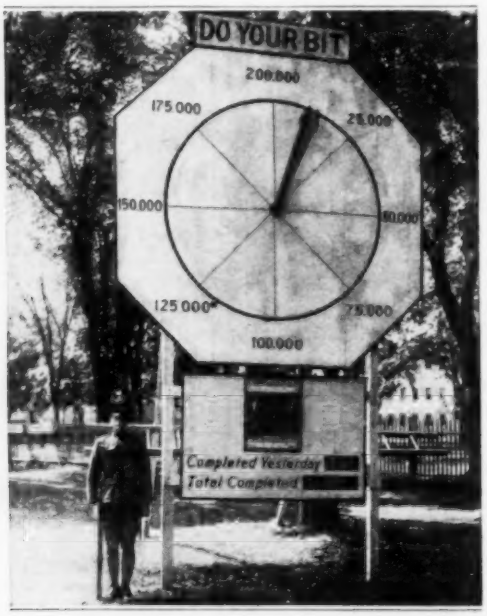
Interior of the Portable Shoe Shop Showing a Soldier Shoemaker at Work: The Equipment Resembles That Found in the Most Modern Repair Establishments, Every Facility being Provided for Rapid, Efficient Work by the Half-Dozen Skilled Soldiers in Charge

A unit which will play an important part in keeping one section of our new army in fighting trim is a shoe-repair department compactly housed in an auto truck and trailer. The former is equipped with machinery, rack, and benches for mending footwear quickly and on a large scale. The equipment includes a lock-stitch machine, a nailer, and apparatus for buffing, scouring, finishing, and patching. The truck is provided with numerous windows which give the workers within plenty of light. In the trailer are leather stores, food supplies, bunks for the crew of six and the driver, and extra machinery. The great advantage of such an outfit is that it can be ready at almost a moment's notice to move with the army and doubtless shoe repairing could be continued while on the road, if necessary.

"CAMPAIGN CLOCKS" SPEED UP ARMS PRODUCTION

"Campaign clocks" which have been used with such success in raising funds for various causes are proving equally effective in stimulating the production of firearms in a large Federal armory. Three huge dials have been erected at points on the factory grounds where the employes can see them. Each bears numbers ranging from 25,000 to

200,000 and each day a green hand is set to indicate the number of pieces



One of Three "Speed-Up" Clocks Erected on the Grounds of a Federal Armory: The Hands are Set Daily to Show the Actual and the Desired Production

produced, while a red hand shows the number which the management planned to turn out. A bulletin below the dial states the daily production and grand total in figures. The clocks have aided materially in speeding up an already busy army of workers.

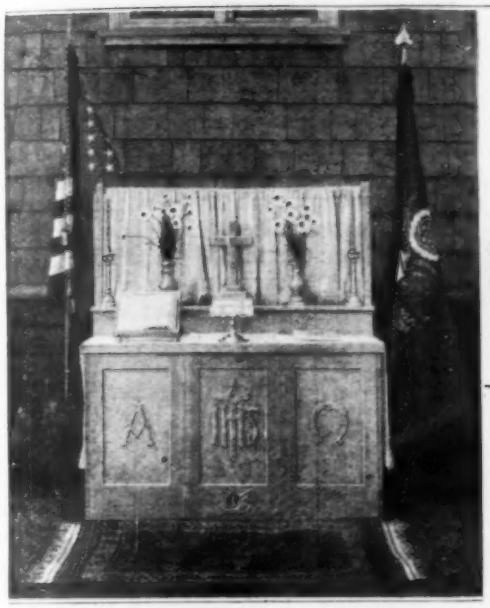
¶A new star was discovered recently in the constellation of Cepheus, near the constellations of Draco and Cassiopeia, by an astronomer at Mt. Wilson observatory.

FOUR-FOOTED FARM TRACTOR STEPS RIGHT ALONG

In plowing and cultivating, a well-trained, intelligent team of horses means much to a farmer. Therefore it is not surprising that many agriculturists are slow in accepting the tractor, with its clumsy wheels and grinding motor, for such work. For these reluctant ruralists, however, a new kind of machine has been invented. It is wheelless and comes as near being a four-legged steel horse as anything ever conceived outside the realm of cartoondom. The ingeniousness of the contrivance makes it humorous. It has feet and legs as well as hips, knees, and ankles, and is designed to amble along as steadily as any sorrel team that ever pulled a disk. The chief difference in the arrangement of the pedal extremities of the machine and those of a flesh-and-blood draft animal, is that there are no forward and hind legs. Instead, there are outside and inside ones, as the two pairs are mounted on opposite sides, rather than ends, of a rectangular frame.

The feet of the steel beast are ski-shaped members and attached to the forelegs by universal joints. The steering is accomplished with levers which cause the limbs on one side to take long steps and those on the other to take

Not a Comic Cartoon, but a Drawing Showing a Four-Legged Farm Tractor Hitched to a Hayrack, is Presented Above. The Machine, Seriously Designed for Real Work, Is Literally a Motor-Driven Steel Horse



Portable Altar for Use in the Army, Made of Oak, Carved and Stained Silver-Gray: The Cross, Vases, Candlesticks, and Book Rest Are of Wood Also

short ones, when a corner, for instance, is negotiated. Reversing is accomplished by shifting the kneecaps from the front to the hind sides of the legs, and speed is regulated by shortening or lengthening the steps, as the case may be. The power is supplied by a gasoline motor installed at the front of the frame. It is pointed out that the "horse" is particularly adapted for cultivating corn, for its height is such that it can straddle a row of six-foot corn without touching the stalks. Only a small fraction of the power consumed by an ordinary wheel tractor is required to propel the walking machine, according to the inventor, and the fuel consumption should therefore be low.

HANDSOME PORTABLE ALTAR FOR COAST ARTILLERY

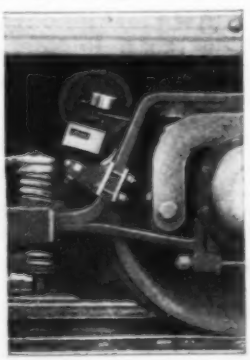
In order that a certain coast-artillery chaplain may be able to conduct religious services in the field according to the ritual of his denomination, he has been presented with a handsome portable altar. Set up, its dimensions are 57 by 33 by 19 in., a size which permits it to be carried with other field

Altar Packed in Its Canvas Case: At Right Is a Field Trunk Having Special Compartments to Hold Altar Furnishings and the Chaplain's Vestments

packages. It is provided with a canvas cover and weighs 95 lb. The material used is oak, stained silver-gray, and carved with ecclesiastical symbols and two crossed cannons, the symbol of the coast artillery. Furnishings, consisting of a cross, a pair of candlesticks, a book rest, and two vases, are made of wood. The vases are metal-lined and are designed to be filled with any available wild flowers. The furnishings, also the communion vessels and the chaplain's vestments, may all be packed in a regulation field-trunk locker provided with special compartments.

NEW CYCLOMETER MEASURES FREIGHT CAR'S TRIPS

The question of just how far a freight car travels in a stated period is of such importance to a railroad that a cyclometer has been devised which registers a car's mileage much as an automobile's mileage is recorded. This meter is attached to the framing of the car truck and is provided with a friction wheel which engages the car wheel, so that the exact distance traversed is indicated. The data supplied in this way does away with guesswork entirely.



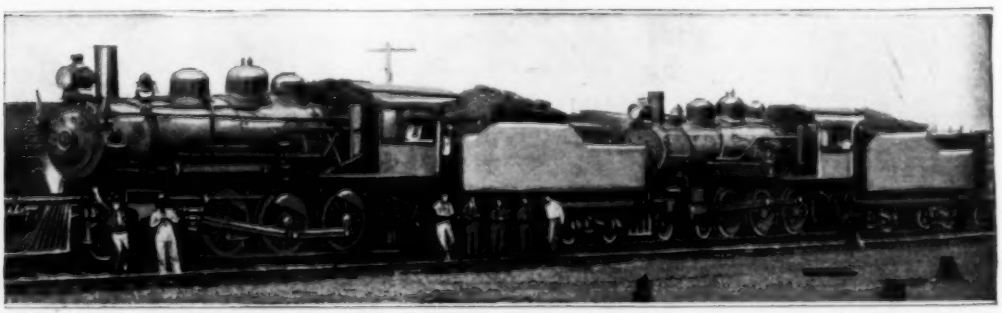
POWER-DRIVEN TURNTABLE CONTROLLED FROM CAR

Convenient for the motorist is a turntable control system, lately devised, that enables a driver to reverse the position of a car without leaving his seat. A push button connected to a heavily insulated cable is held over the middle part of the revolving concrete platform by an arm extending from a pole installed at one side. This starts and stops an electric motor in a pit beneath the turntable. The latter is placed in the driveway immediately in front of the garage entrance or inside the building, as best suits local conditions. In a garage floor it eliminates all backing.

The Push Button Hangs within Easy Reach, Enabling the Driver to Start and Stop the Turntable without Leaving the Car

POPULAR READING COURSE FOR PATRIOTIC MEN

Thirty articles of about 1,000 words each have been prepared by the War Department as a preliminary course of instruction for men who have been selected for service in the national army. While they are designed primarily to prepare the selected soldiers for intensive training, it is expected that they will prove equally interesting to thousands of other readers. With this in view the department has asked all daily papers to publish one article each week day for a period of five weeks following their release. This means will be relied upon for the present in making the articles available for the public. However, at a later date, the government may reprint the material in pamphlet form. The language of the series will be simple and nontechnical, and the authors have not presupposed any military knowledge on the part of the readers. Among the subjects which will be treated are: "Making Good as a Soldier," "Cleanliness in Camp," "Your Health," "Marching and Care of Feet," "Fighting Arms of the Service," "Army Insignia," "The Army System of Training," "Army Courtesy," and "The Soldier in Battle."



Making Up for the Car Shortage: Train Composed of 50 Logging Cars Util-

SKINS OF FIVE-YEAR-OLD SEALS TO BE TESTED

During the coming season the secretary of commerce will permit the killing of a limited number of male five-year-old seals on the Pribilof Islands, Alaska, for the purpose of experimenting with their skins. A few pelts of this character have been dressed and machined and, according to experts, are fully equal to the average skins of younger seals that heretofore have made up the quota for the natives' use. The probable high price for seal pelts and the relatively large number of five-year-old animals on the islands have been considerations which led the secretary to sanction the experiment. In many cases these skins are about twice as large as those of the three-year-old animals.

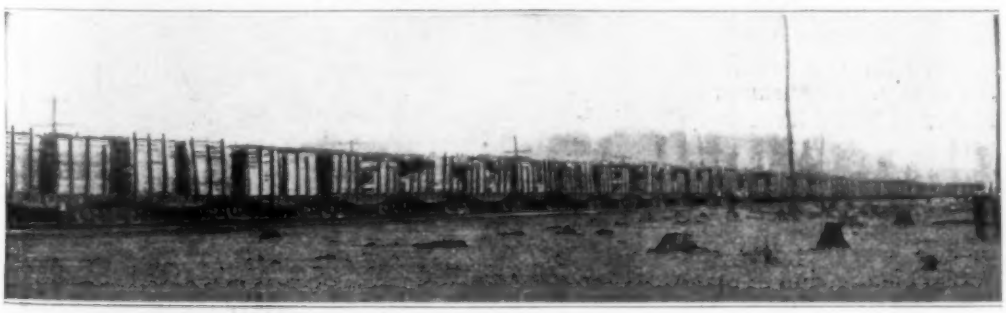
CARRY BIG LUMBER LOADS ON LOGGING CARS

In the serious shortage of railway cars which has existed during recent months the lumber companies, along with other concerns, have utilized every available resource to obtain transportation facilities. A large lumber company in Louisiana found a way out of the difficult situation by taking 50 of its logging cars from its logging roads and making them up into one long lumber train. By this unusual arrangement it was able to transport 1,500,000 ft. of lumber in a single trainload. The effort was so successful that the train has made a number of trips to the North.

TRAVELING SIGN AN INDEX TO RED CROSS "DRIVE"

The fact that the streets intersecting Fifth Avenue, New York City, bear numerical names gave an opportunity recently for the use of a novel sign in connection with the Red Cross $100,000,000 campaign. A barrel, suitably painted and mounted on a low truck, served as a base for a circular sign which read: "The Number of This Street Is the Number of the Millions Given to the Red Cross to Date. Help Me Along to 100th Street." The sign was placed in the center of Fifth Avenue and gradually was moved northward and stopped at streets whose numbers corresponded to the number of millions subscribed.

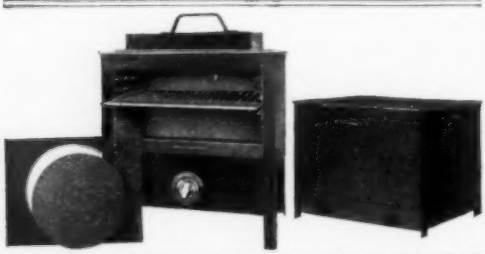
The Position of This Sign in Fifth Avenue Marked the Progress of a Red Cross Campaign: The Number of the Intersecting Street Told the Number of Millions Pledged



ized by a Louisiana Lumber Company to Carry Lumber to Northern Points

COMPACT ELECTRIC RANGE SERVES MANY PURPOSES

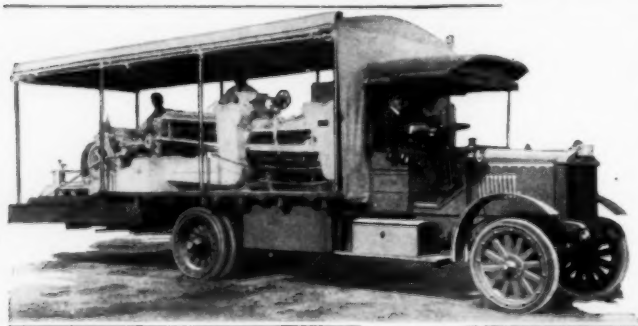
A new combination electric kitchen range is especially suited for use in a small apartment, kitchenette, or buffet because of its compactness and many uses. It consists of a broiler and a removable oven. The heating grid is permanently placed in the upper section of the broiler, the heat being thrown downward by a removable baffle plate. For boiling, the baffle plate is placed in the slide under the heating unit, while another plate is placed on top which is provided with a lid that can be kept in place or removed as the occasion demands. For baking and roasting, the oven is substituted for the top plate and lid. A three-heat switch controls the current. The oven retains heat well, being double-walled and well insulated.



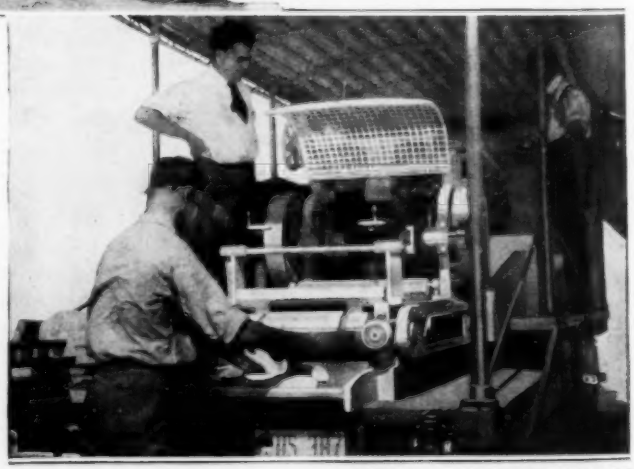
New Combination Electric Range: As Shown in the Center It Is Ready for Broiling. The Oven Stands at the Right

MOBILE BAKERY EQUIPMENT DESIGNED FOR ARMY USE

For the army commissary department there is now a new portable bakery unit. It is one of the latest pieces of army equipment, and incidentally one of the most interesting, that has been devised for the benefit of Sammy. Thousands of loaves of bread have to be produced daily at field ovens to feed the forces at the front. The new apparatus accomplishes most of the work except the actual baking, and in practical demonstrations has proved itself capable of turning out 6,000 loaves of bread an hour. The machinery is carried on a large motor truck so that the outfit has the same mobility as the portable ice-making plants and kitchens commonly in use in the field. The five attendants employed in its operation are able to do as much work as can ordinarily be accomplished by a hundred men. In view of its efficiency, the high cost of the equipment is really justifiable.



General Appearance of the Bread-Making Apparatus, Which Is as Portable as the Ordinary Field-Kitchen Outfit



PHOTOS COPYRIGHT, UNDERWOOD & UNDERWOOD

One of the Machines at Work: With Five Men Attending to Its Operation, It Produces 6,000 Loaves of Bread an Hour

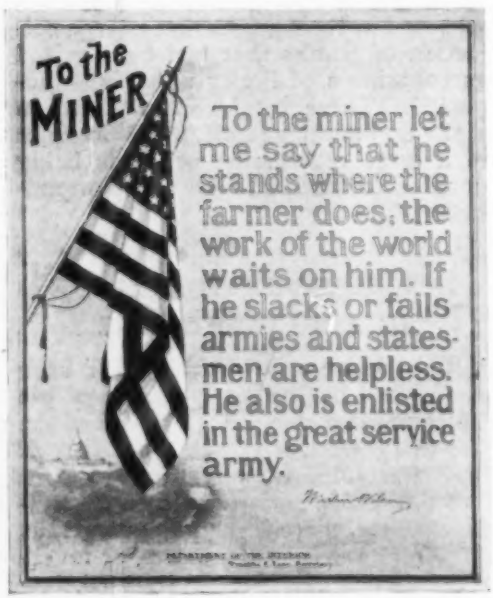
New Type of Farm Tractor Which is Suited to a Variety of Uses Because of Its Small Size, Good Speed, and Low Fuel Consumption: The Wheels with the Radiating Legs Are the Drivers

SMALL FARM TRACTOR TRAVELS ON LEGS

A small, easily managed farm tractor is now on the market which has as a conspicuous feature two drive wheels that are provided with numerous pairs of radiating legs. These penetrate the dirt as the machine travels over plowed or other soft soil, giving it the desired tractive force. The engine, fuel tank, etc., are situated between the two drivers, while the operator's seat is mounted above two ordinary wheels at the rear. The machine is only 4 ft. high and 3½ ft. wide, and permits a center hitch for a plow or cultivator, so that it is well suited for use between rows of fruit trees with low-hanging branches. It can turn a plow within a radius of 6½ ft., the fuel consumption is 1½ to 1¾ gal. per acre, and the speed is two and one-half miles per hour.

¶The capacity of Great Britain for producing munitions has so increased that munition making in Canada has been stopped by government order.

POSTER MAKES PATRIOTIC APPEAL TO MINERS


To the MINER
To the miner let me say that he stands where the farmer does; the work of the world waits on him. If he slacks or fails armies and statesmen are helpless. He also is enlisted in the great service army.

A Poster Which is Painted in Colors and is being Distributed by the Department of the Interior to Mining Districts throughout the Country: It Reproduces a Patriotic Appeal by President Wilson

BOOTLEGGERS' TRUNKS SOLD TO AID RED CROSS

Of the many means employed in the recent Red Cross campaigns to raise funds, few equal in novelty the sale held by the police officials of Portland, Ore., who had in their possession a large collection of trunks that had been seized as containers of liquor unlawfully imported. These trunks were placed in a pile and auctioned off in the presence of a large crowd, the proceeds being donated to the local Red Cross organization.

Raising Funds by Selling Bootleggers' Equipment: Auctioning Off Trunks Seized as Containers of Illegally Imported Liquor

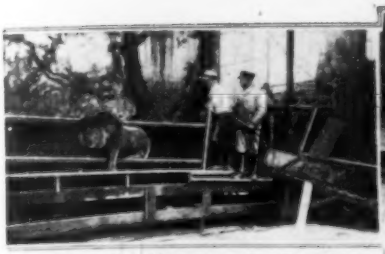
WHY SCANDINAVIANS NEED COAL DESPITE FORESTS

Many people have wondered why Scandinavian countries which possess such large forested regions as compared with their total areas should be so seriously affected by the coal shortage caused by the submarine campaign. In these countries coal is selling at 20 times its normal price and yet the demand is greater than the supply. However, a few facts regarding the fuel situation of Norway alone show that the Scandinavian forests would be inadequate as a fuel source, even if the wood could be seasoned and transported. The total output of the Norwegian forests is equivalent to about 3,450,000 cords, and two-thirds of this is for home consumption. On the other hand, Norway's imports of coal, coke, mineral oils, etc., are equivalent to 3,500,000 tons of coal, or some 4,500,000 cords of wood. It is apparent therefore that if all the normal forest output were devoted to fuel purposes and if no coal were available, the forests would have to be seriously depleted.

IMMENSE FOREIGN TRADE DURING WAR YEARS

Remarkable new records have been established by the foreign trade of the United States since the outbreak of the war in 1914. During the fiscal year of 1917 the imports amounted to over $2,600,000,000, and exports to $6,294,000,000 for merchandizing only, thus showing an excess of exports, or favorable balance of trade, of over $3,600,000,000 with a total foreign trade of nearly $9,000,000,000. The exports of the past fiscal year show an increase of $1,961,000,000 over the year before and an increase of $3,929,000,000 over 1914, which was the last normal year before the war. The gain in the balance of trade for 1917 over 1916 amounted to nearly $1,500,000,000. The gain over 1914 was $3,164,000,000. These comparisons with the pre-war period indicate what a tremendous shifting of trade has resulted from that great conflict. It is of interest to note that in June of this year the total imports were $307,000,000 of which 71 per cent was entered free of duty in accordance with present tariff regulations.

"AWFUL LION" SAFELY CAGED WHILE "HORRIFYING" ACTORS



At the Crucial Moment, the Lion Invariably Crawled Out of the "Log" and Spoiled the Picture

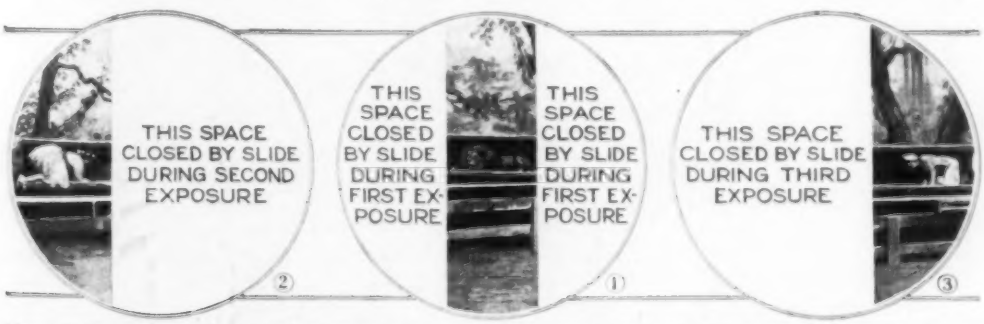
The Camera Men were Stationed in This Wire Cage Where They could Work Unmolested

Pulling a Lion by the Tail Is Not so Difficult as It Is Unpleasant. This Shows How It is Done

Interesting as well as amusing is an example of triple-exposure work in the movies that has been called to notice by the production of a film comedy in which a capable-looking lion assumes an important part. In the course of the business a jungle maid and a comedian crawl into opposite ends of a "hollow log," in the middle of which is the lion. That, with exciting embellishments, is the screen version of what occurred. But that is not all that happened.

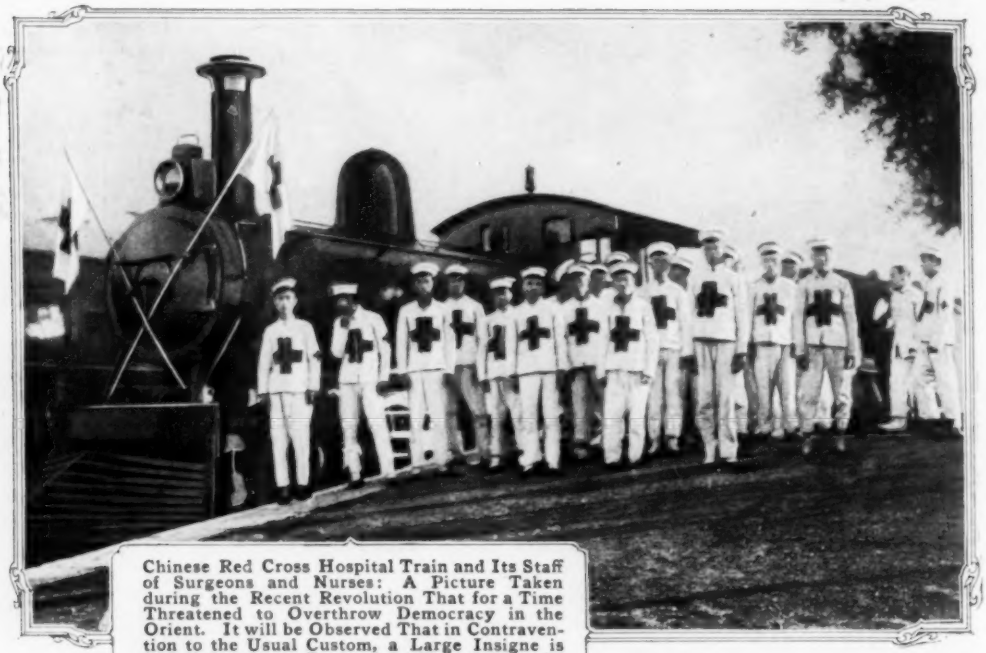
The lion was driven into the log and compelled to crouch in a certain, carefully marked, space. Only a narrow strip in the middle of the film was exposed when the animal was photographed. An exact record of the number of separate pictures taken was kept. On a certain count he was made to snarl viciously and show his teeth. That constituted the first step. The lion was returned to his cage and the jungle maid put through her rôle, the film being rolled back to the starting point, and all of it—except that part extending from one edge of the exposed center section to the outer margin—shielded from light. On that strip the girl's action was recorded. After a prescribed number of pictures were made, to show her end of the scene, she entered the log and started to crawl toward the center. At the proper instant—this being determined by count—she became "terrified" by the sight and snarl of the lion and was momentarily unable to retreat. Then at a signal from the director, she appealed to the comedian, supposed to be in the opposite end of the log, to pull the beast out by its tail. Subsequently, the film was again run back and the third exposure—this showing the comedian's action on the opposite edge of the film—made.

¶What is pronounced a new world's record for uninterruptedly looping the loop in an aeroplane with a passenger was established recently by Edward Stinson when, accompanied by a woman passenger, he executed 34 consecutive loops without a break.


THIS SPACE CLOSED BY SLIDE DURING SECOND EXPOSURE
2
THIS SPACE CLOSED BY SLIDE DURING FIRST EXPOSURE
THIS SPACE CLOSED BY SLIDE DURING FIRST EXPOSURE
1
THIS SPACE CLOSED BY SLIDE DURING THIRD EXPOSURE
3

Above is Explained How the Triple Exposure was Made. Several Failures Resulted Before the Scene was Successfully Filmed, for the Lion Was Not Always Prompt in Obeying the Director

INTERESTING SIDE LIGHTS ON WORLD-WIDE WAR



Chinese Red Cross Hospital Train and Its Staff of Surgeons and Nurses: A Picture Taken during the Recent Revolution That for a Time Threatened to Overthrow Democracy in the Orient. It will be Observed That in Contravention to the Usual Custom, a Large Insigne is Sewed across the Front of the Jackets Worn by the Men. This is to Give the Workers Greater Protection Than They Otherwise Might Have

PHOTO COPYRIGHT, UNDERWOOD & UNDERWOOD

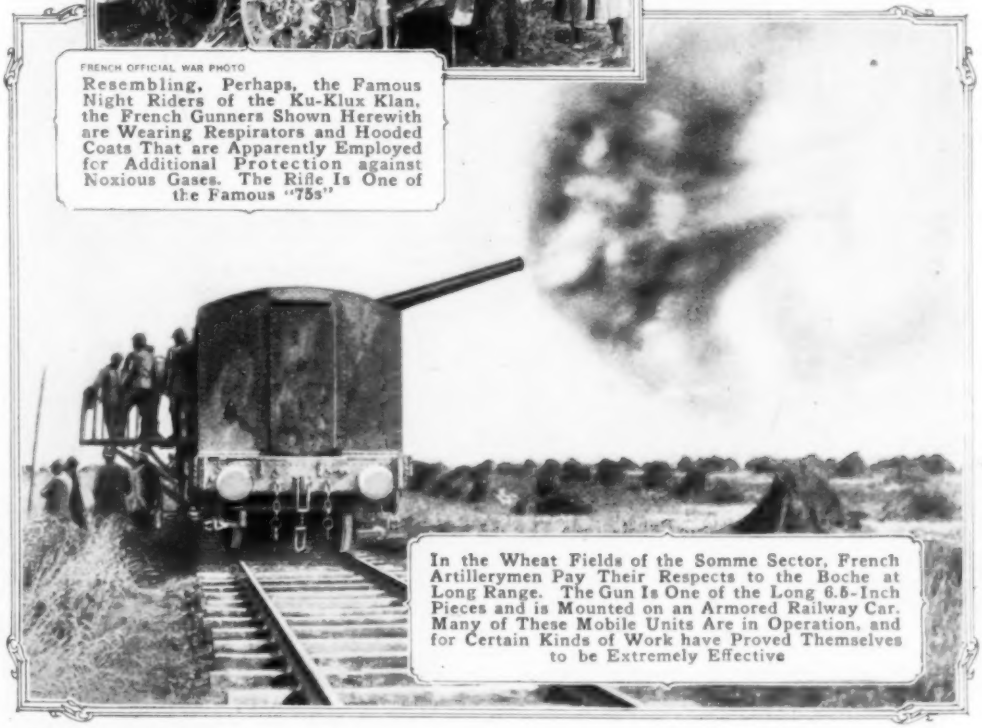
Here Are Some of Russia's Women Patriots, Members of the "Legion of Death." Many of These Amazons Are College Girls and Are Members of Some of the Country's Prominent Families. Their Heroism has Demonstrated Their Right to Carry the Standard of Liberty and Democracy Wherever Gallant Fighting is to be Done. During Recent Engagements with the Boche They Proved to Be a Surprisingly Formidable Foe. Hundreds of Stanch-Hearted Girls Are Now in the Service

AT THE FRONT IN FRANCE WITH THE POILUS

Railway Construction in the War Zone has been Reduced to a Fine Art, as is Indicated by the Photograph Presented at the Top of the Page. It will be Observed That Rail Locks are Employed Instead of Spikes, and That Track is Laid Almost as Rapidly as the Ties can be Distributed and Alined. The Supply Train Follows the Workmen as the Rails are Projected. The Picture was Taken in the Aisne District

FRENCH OFFICIAL WAR PHOTO

Resembling, Perhaps, the Famous Night Riders of the Ku-Klux Klan, the French Gunners Shown Herewith are Wearing Respirators and Hooded Coats That are Apparently Employed for Additional Protection against Noxious Gases. The Rifle Is One of the Famous "75s"



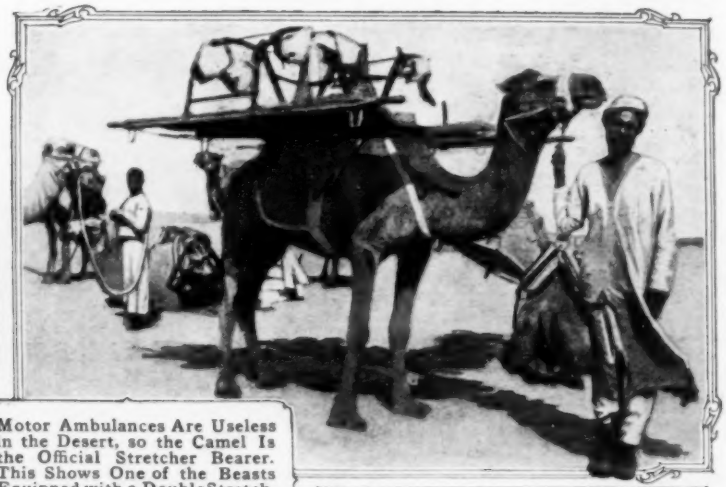
In the Wheat Fields of the Somme Sector, French Artillerymen Pay Their Respects to the Boche at Long Range. The Gun Is One of the Long 6.5-Inch Pieces and is Mounted on an Armored Railway Car. Many of These Mobile Units Are in Operation, and for Certain Kinds of Work have Proved Themselves to be Extremely Effective

FRENCH OFFICIAL WAR PHOTO

SOME WAR-TIME DEVICES OF ODD CHARACTER

COPYRIGHT, INTERNATIONAL FILM SERVICE

Contrary to First Impression, the Headgear of the Sammy Pictured Above Is Not That of a Chinese Woman of Rank. It Is a New Type of Helmet and Face Shield That is being Subjected to Tests by the War Department. The Rest of the Outfit Is Semi-flexible Armor Made of Thin Steel Plates



Motor Ambulances Are Useless in the Desert, so the Camel Is the Official Stretcher Bearer. This Shows One of the Beasts Equipped with a Double Stretcher Fitted with Frames That Prevent Wounded Men from Falling from Their Elevated Berths

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The Sign Marks the Position of an Unexploded Projectile Fired on the Macedonian Front and Warns Tommy Not to Disturb It. Such Shells are Eventually Collected by Salvaging Crews

The Poilus are Conducting a Campaign of Education for the Benefit of the Boche. This Shows One of Them Employing a Contrivance That Hurls French Newspapers into the German Trenches

War Is Doubtless the Greatest Stimulus for Invention, Since "Necessity" Continually Presents Itself. The Photograph Reproduced Herewith Shows a Pack Donkey Carrying a Reel of Wire for French Soldiers Who are Laying Communication Lines on the Front in Macedonia. In Passing, It Is Interesting to Note That the French, Who are Using Many American Mules, are Reputed to have Made a Great Improvement in the Beasts. By Performing a Simple Surgical Operation, It is Said They have Eliminated the "Hee-Haw"

USED BY SAMMIES AND BROTHERS-IN-ARMS

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

Tomato Cans with Perforated Bottoms Make Excellent Outdoor Shower Baths When Suspended in Midair and Fed by a Pipe as is Shown Above. The Picture Gives a Rather Intimate Glimpse of Some of the Enlisted Personnel of the New York National Guard at a Training Camp. After Vigorous Work in the Full Glare of the Blazing Sun, the Comfort of a Cool Shower, Even from Improvised Apparatus Like This, Requires No Imagination

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

This Is One of the Most Modern Portable Kitchen Units That has been Constructed for Army Purposes. It was Presented to the Engineering Corps of the New York National Guard by a Good Fellow and Is Now in Regular Use. In Addition to a Range and Steam-Cooking Equipment, It Possesses a Fair-Sized Oven, a Storage Compartment in Which Supplies are Carried, and a Refrigerator for Perishable Foods. The Outfit Cost Approximately $7,000

IN FRANCE WITH MAJOR GENERAL PERSHING

"Greater love hath no man than this, that a man lay down his life for his friends": The Picture Shows the Military Funeral of the First American Boy to Fall Following Our Entrance into the World Struggle against the "Mad Dog" of Europe. The Young Fellow, Paul Gannett Osborn, Montclair, New Jersey, a Member of the American Ambulance in France, was Killed While Removing Wounded French Soldiers from the Battle Field

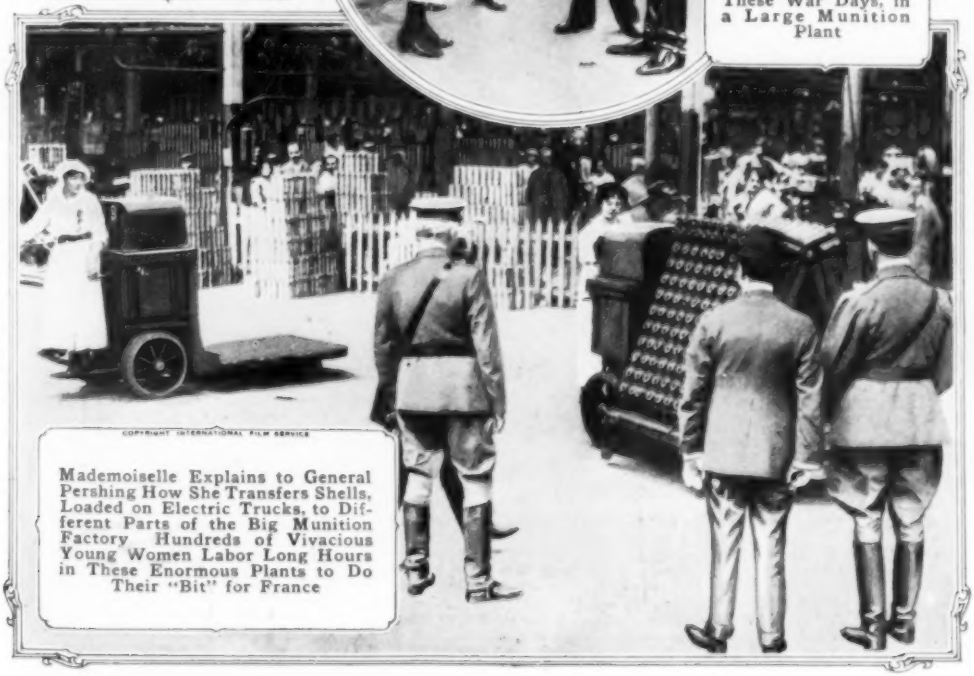
This Gold-Mounted First-Aid Kit was Auctioned for a Large Sum of Money during a Recent Red Cross Campaign in San Francisco. It has been Taken to France and Presented to Major General Pershing by a Member of the American Field Service

Boys in the Fourteenth Section of the American Ambulance Corps have Acquitted Themselves Proudly. A Short Time Ago, in Recognition of the Gallant Work They had Done, Their Flag was Decorated with the French War Cross. The Photograph at the Side Shows One Member of the Group, Lieutenant Alan Muhr, Receiving a Medal for Bravery and Splendid Work under Fire

Major General Pershing at the Grave of a Loyal Frenchman and True, That Sacrificing Champion of Democracy, the Marquis de Lafayette, a Patriot Whose Memory is Cherished and Revered by All Americans: The Spirit That Animated Lafayette in Revolutionary Days Now Stirs the Blood of the Commander of Our Expeditionary Forces in France

COPYRIGHT INTERNATIONAL FILM SERVICE

There Is a World of Sentiment in a Fresh White Rose. One is Presented to the "Big Chief" of the Sammies by a Wisp of a French Maid, a Hard Little Worker, These War Days, in a Large Munition Plant



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Mademoiselle Explains to General Pershing How She Transfers Shells, Loaded on Electric Trucks, to Different Parts of the Big Munition Factory. Hundreds of Vivacious Young Women Labor Long Hours in These Enormous Plants to Do Their "Bit" for France

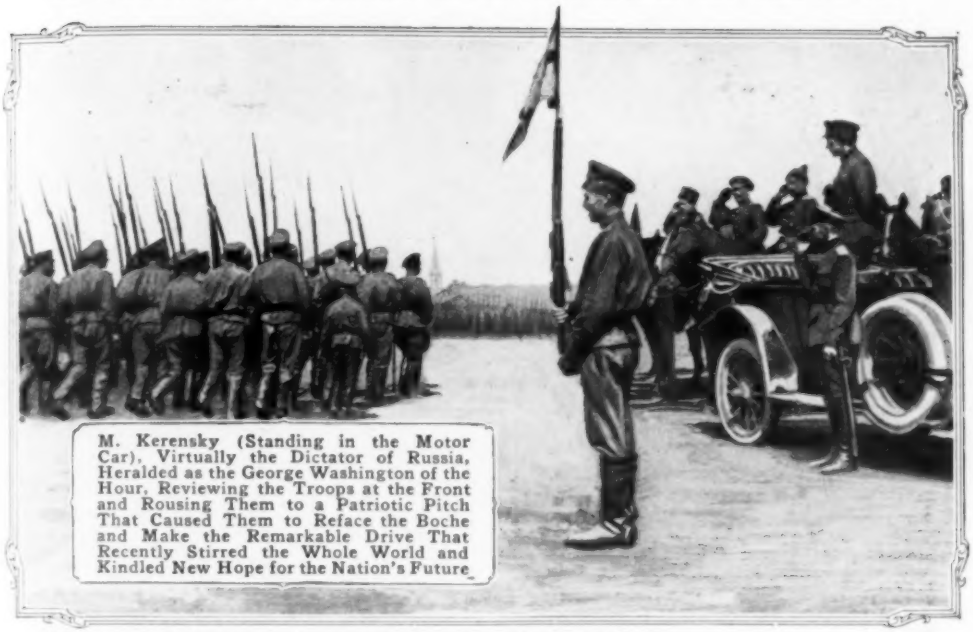
BRITISHERS AFTER BATTLE AND AS OUR GUESTS

Reproduced Above Is a Photograph That Is Interesting Not for Its Artistic or News Value, but Because It Gives a Clear Portrayal of the Varied Impulses That Seize Soldiers Immediately Following a Desperate Battle. These Men have Just Passed through the Dread "Valley" and Left Many of Their Comrades on the Field. It will be Observed That Some of Them have Dropped to the Ground Exhausted, That Others are Bathing Themselves as Best They Can, and That Still Others are Trying to Cleanse Their Garments of Blood and Trench Filth

PHOTO COPYRIGHT, UNDERWOOD & UNDERWOOD

The "Kilties" have been Here to Assist in the British-Canadian Recruiting Campaign. When They Marched in Michigan Avenue at Chicago, the Police Were Unable to Hold Back the Crowds of Men and Women Who Surged Out on the Pavement to Cheer Them. At New York and Boston They were Given Rousing Welcomes That They Well Deserved for They Are Heroes of Vimy Ridge. The Picture Presented Herewith was Taken When Mayor Mitchel was Serenaded by Highland Pipers Who Gathered in Front of Gotham's City Hall

LEGIONS OF RUSSIA AND FRANCE IN REVIEW

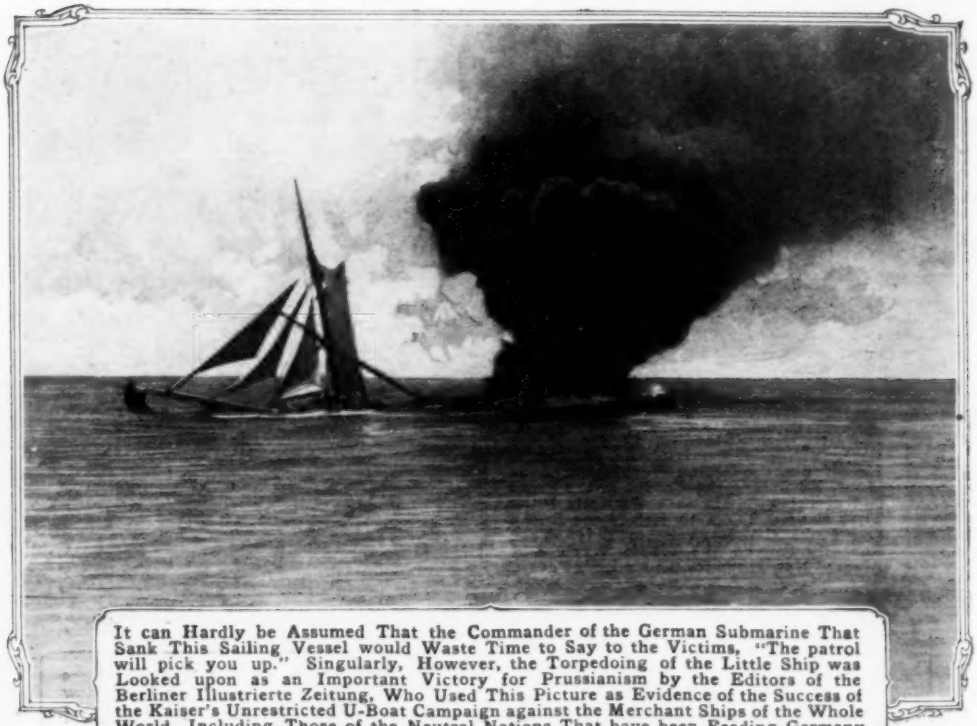


M. Kerensky (Standing in the Motor Car), Virtually the Dictator of Russia, Heralded as the George Washington of the Hour, Reviewing the Troops at the Front and Rousing Them to a Patriotic Pitch That Caused Them to Reface the Boche and Make the Remarkable Drive That Recently Stirred the Whole World and Kindled New Hope for the Nation's Future

The Forty-Second Division of the French Army Passing in Review Back of the Firing Zone in the Region of the Aisne Early in July: The Occasion Was One of Great Ceremony and Pomp in Which the Whole of the Army Participated

During the Review of the French Forces Many Galiant Poilus were Presented with Military Crosses in Acknowledgment of the Services Rendered by Them. Likewise Battalion and Regimental Flags were Similarly Decorated to Honor Bodies of Troops That had Particularly Distinguished Themselves in the Military Activities of the Past Year

CONTRASTING VIEWS OF GERMAN EFFICIENCY



It can Hardly be Assumed That the Commander of the German Submarine That Sank This Sailing Vessel would Waste Time to Say to the Victims, "The patrol will pick you up." Singularly, However, the Torpedoing of the Little Ship was Looked upon as an Important Victory for Prussianism by the Editors of the Berliner Illustrierte Zeitung, Who Used This Picture as Evidence of the Success of the Kaiser's Unrestricted U-Boat Campaign against the Merchant Ships of the Whole World, Including Those of the Neutral Nations That have been Feeding Germany

FRENCH OFFICIAL PHOTOGRAPH

German Prisoners of War Engaged in the Reconstruction of Buildings Previously Damaged and Destroyed by Them and Their Comrades during the Bombardment of a French Town: It Is Pitiful That the Major Injuries Worked by the Kaiser's Forces Are Irreparable. The Wrongs Committed can Never be Righted, but, in a Measure, They may Eventually be Compensated by Crushing Military Despotism so That Future Generations may be Safe from Its Yoke. This, at Least, Is the Avowed Purpose of the Civilized Nations Involved in the Conflict

SWIFT GERMAN PLANES SWARM OVER LONDON

One of the Small Victims of Germany's Mid-summer Aerial Attack upon London: It was Officially Reported That 40 Persons were Killed and 194 Injured. Of the Latter Number, 52 Were Children. Such Pictures Form an Index of Prussianism and Give Warning of the Dangers of Premature Peace

The Flying Huns Approach London in Orderly Formation at a Height of 7,000 Feet. This Is One of the Most Remarkable Aerial Photographs Ever Made. It Shows More Than 30 Bombing and Battle Planes, Most of Them Dual-Motored Gothas, on a Diabolical Mission

PHOTOS COPYRIGHT INTERNATIONAL FILM SERVICE

Women Ambulance Drivers Racing to Their Posts in Response to a General Alarm Sounded amid the Thundering of Prussian Bombs: The Aeroplanes Appeared over the Metropolitan Area Shortly after 10 O'Clock on Saturday Morning, July 7. About 100 Bombs, Each Weighing 60 Pounds, were Dropped. Distress Calls were Answered by Nervy Women, Such as These, and Red Cross Nurses. Two Outstanding Effects of the Raid were Loud Demands for Reprisals and More Adequate Aerial Defenses. Since, Additional Assaults have been Made

WAR'S EFFECT UPON WOMEN AND CHILDREN

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Germany's Treatment of French and Belgian Women in Occupied Territory has Astounded the Whole Civilized World. While the Picture Above does Not Deal with Any of the Abhorrent Phases of Teutonic Mastery, It Nevertheless Shows the Boorishness of Prussianism Which Puts into Practice Some of Nietzsche's Warped Philosophy. The Picture, Found in the Possession of a Captured German Officer, Shows Women of a French Town—Not Peasants Who are Used to Hard Labor—being Herded into the Fields by One of the Kaiser's Puppets

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Inspired by the Same Motives That Caused the Famous Madame Jean Velasquez to Begin Her Romantic Career as a Soldier a Half Century Ago, This Arizona Bride Tried to Accompany her Husband to the Trenches of France. She Crossed the Atlantic with the Sammies, but was Discovered and Sent Home

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In American Homes during the Next Year or So Many Touching Little Scenes Such as This will Undoubtedly be Enacted. It Is a Side Light on War That has Prevailed for Centuries and Often Brings Privation and Suffering. But Those Who Feel the Sting of War Should Compare This Picture with That Above; Then Reflect

Fleeing German "Kultur" in Macedonia: The Photograph, Taken after the Teutons had Executed One of Their Aerial Bomb-Dropping Escapades, Shows Women and Children Deserting Their Burning Village and Seeking Safety in the Open. Regardless of Where He is Operating, Whether in the Air, on Land, or under the Sea, the German Has No Respect for Defenseless Noncombatants, Even though They Be Women and Children of an Ancient Province

Young Russia Is Not Unmindful of the Significance of the Great Social Upheaval That has Converted Its Dark Empire into the World's Youngest Republic. Children have Taken a Conspicuous Part in Many of the Recent Public Demonstrations. Not Long Ago Hundreds of Them Paraded the Streets of Petrograd Carrying Banners Bearing the Legend: "Long Live Education for the People." With Freedom and Schooling, These Youngsters will Exert a Profound Influence upon Russia's Future

AMERICA FORGETS THE "YARROWDALE" CASE

Interned Sailors of the "Kronprinz Wilhelm" Lined Up to be Counted before Beginning Work: The Men are Employed in Erecting Quarters near Fort McPherson, Georgia, Which will Shelter 2,500 Germans

This Hotel at Hot Springs, North Carolina, was Leased by the Government Early Last June and has Since been Occupied by Interned Officers of German Merchantmen and Commerce Raiders. As the Photograph Indicates, the Men Have Far from Unpleasant Surroundings

Wash Day at the Hot Springs Camp: German Officers Laundering Their Linens. Practically All of the Labor Required in Maintaining the Place is Supplied by the Men, Who Receive $20 a Month for Their Services, Providing They Care to Work

This Little Rustic Village has been Constructed by the Interned Germans during Their Leisure Time. Most of the Material Is Driftwood That has been Collected from an Adjacent River. The Grounds Are Quite Extensive, so Plenty of Space is Provided for Establishments of This Kind, as Well as for Various Sports

IN CARING FOR INTERNED GERMAN SEAMEN

The Frame Houses Visible within the Stockade Above Sheltered the Officers of the "Cormoran" during Their Stay on the Island. After Several Weeks They were Brought to the United States and are Now Held at One of the Concentration Camps. The Elevated Platforms Shown in the Picture were Used by Sentries

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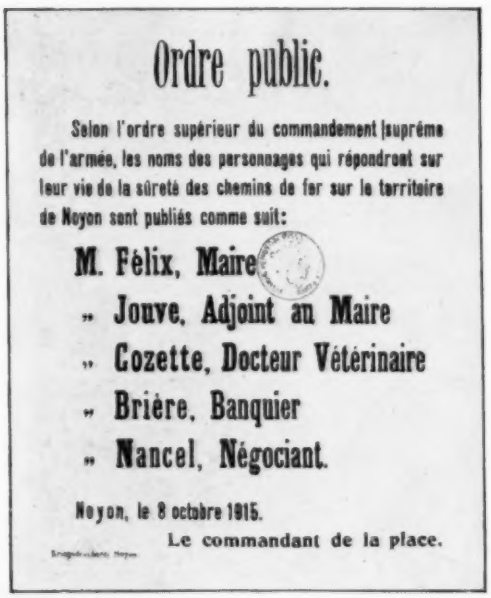
Group of German Prisoners of War being Questioned by an Officer: These Young Fellows, Most of Them Mere Boys, Belong to the Class of 1918 and were Captured by the French during an Advance in the Oise District

The Interned Seamen Preparing to Depart from Guam to the United States: Most of Them are Dressed in the Uniforms of American Sailors Because They Left Their Own Clothing Behind When They Took to the Water from Their Sinking Ship

The Tent Camp and Stockade for Enlisted Personnel of the German Ship "Cormoran," Which was Interned at Guam Previous to Our War Proclamation: Upon America's Entrance into the World Struggle, the Vessel was Destroyed in the Harbor by Its Crew. The Men were Forced to Leap Overboard and Swim Until Picked Up. The Camp Pictured Herewith was Then Prepared for Them

GERMAN PLACARDS EVIDENCE OF NOYON'S OPPRESSION

Since the Germanic hordes smashed their way through Belgium into northern France, the world has learned something of what military rule by an autocratic government means in occupied territory. Men and women have been dragged into slavery, children outraged, food commandeered, property seized or ruthlessly destroyed, and countless other diabolical crimes perpetrated in the name of "military necessity." When the French town of Noyon was evacuated by Von Hindenburg's forces last spring, thousands of official notices were left behind. These placards furnish documentary evidence of how the people in that particular community were oppressed by the iron rule of the mailed fist. Many of the posted announcements bear rules that any army under similar circumstances would have perfect right to impose. Others, however, show the bigotry and boorishness of German character and the tyrannical injustice of German military rule. Staggering fines, long terms of imprisonment, and capital punishment were imposed for trifling offenses. During the winter months the inhabitants were compelled to remain indoors after five o'clock in the evening. Permits had to be obtained and fees of 25 and 50 cents paid before one could make a trip by carriage or train. To damage telegraph or electric-light lines in any way was to incur death.



Ordre public.

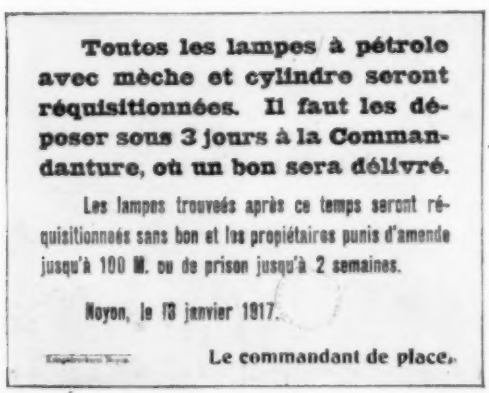
Selon l'ordre supérieur du commandement suprême de l'armée, les noms des personnages qui répondront sur leur vie de la sûreté des chemins de fer sur le territoire de Noyon sont publiés comme suit:

M. Félix, Maire.
„ Jouve, Adjoint au Maire
„ Cozette, Docteur Vétérinaire
„ Brière, Banquier
„ Nancel, Négociant.

Noyon, le 8 octobre 1915.

Le commandant de la place.

The Above Notice Informs the Inhabitants in French That the Mayor, His Assistant, a Doctor, a Banker, and a Merchant are Regarded as Hostages and are Held Responsible for the Safety of the Railways in the Vicinity of Noyon. In Other Words, These Men would be Punished with Death should a Bridge be Dynamited, or Other Injury Committed



Toutes les lampes à pétrole avec mèche et cylindre seront réquisitionnées. Il faut les déposer sous 3 jours à la Commandanture, où un bon sera délivré.

Les lampes trouvées après ce temps seront réquisitionnées sans bon et les propiétaires punis d'amende jusqu'à 100 M. ou de prison jusqu'à 2 semaines.

Noyon, le 13 janvier 1917.

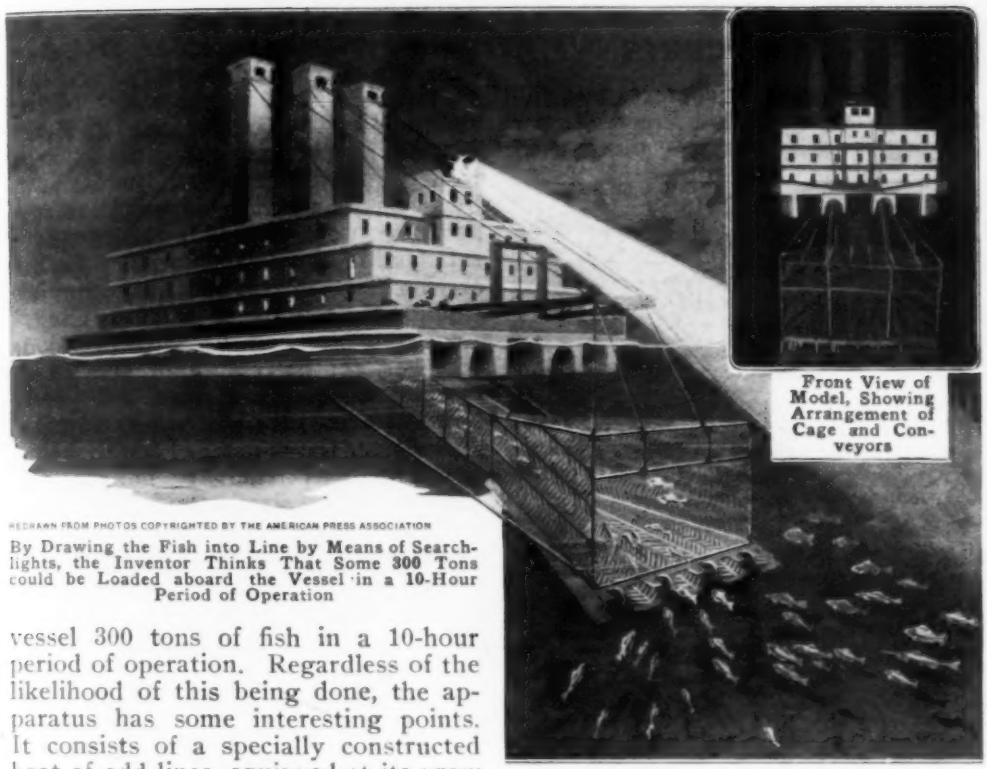
Le commandant de place.

This Placard Announces That All Inhabitants Who Possess Kerosene Lamps with Wicks and Cylinders must Deliver Them to the Commander of Noyon within Three Days. Otherwise They will be Subject to a Fine of 100 Marks or Two Weeks' Imprisonment

One poster has an amusing turn to it, for it gives a glimpse of the Prussian love of "lording it." The announcement calls attention to the fact that all masculine inhabitants 12 or more years of age are required to doff their hats upon meeting a German officer or functionary with the rank of officer. It further states that many young men have neglected to observe the rule, or have obeyed it in a derisive way. In consequence, warning is given that strict conformance to the order is demanded.

CLAIMS FISH HARVESTER TO HAVE BIG CAPACITY

By constructing and operating an enormous harvester in accordance with plans developed by him, an inventor contends that the fish industry could be put on a more profitable basis than it now enjoys. He even goes so far as to estimate that the machine would capture and deliver to the deck of its



Front View of Model, Showing Arrangement of Cage and Conveyors

REDRAWN FROM PHOTOS COPYRIGHTED BY THE AMERICAN PRESS ASSOCIATION

By Drawing the Fish into Line by Means of Searchlights, the Inventor Thinks That Some 300 Tons could be Loaded aboard the Vessel in a 10-Hour Period of Operation

vessel 300 tons of fish in a 10-hour period of operation. Regardless of the likelihood of this being done, the apparatus has some interesting points. It consists of a specially constructed boat of odd lines, equipped at its prow with a large adjustable steel trap which ensnares the fish and leads them to a conveyor. The harvester would be used at night and its work aided by searchlights. The projectors would illuminate a triangular area extending far in advance of the craft, which is designed to travel at a speed of about 10 miles an hour. The fish, the inventor points out, attracted by the light, would congregate in large numbers in the direct path of the boat. Lack of illumination immediately in front of the trap would momentarily confuse them and cause them to be guided by the walls to the rapidly moving conveyor.

PLANKS OF CONCRETE USED IN SEASHORE WALK

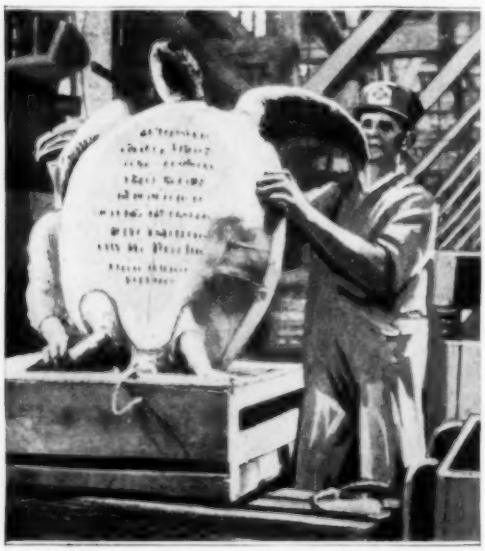
When a board walk at an ocean port was repaired recently, some 20 feet of it was laid with concrete "planks," as an experiment. They are reinforced with steel rods and are about the same size as ordinary planks. It has been found that they withstand wear well, but are disliked because pedestrians feel that they are tiring to walk on.

Board Walk at an Ocean Resort Which has been Repaired in Part with Planks of Concrete: These have been Found Very Durable but Less Pleasing to Walk On Than Wood

¶The Y. W. C. A. will spend $100,000 in building shelters near camps where soldiers can meet women relatives and friends.

SHIP LIVE "MOCK" TURTLES WITHOUT CRATE

Unusual simplicity characterizes the express companies' requirements for shipping large live turtles, much used



A Live Turtle Which Needs No Crate for Shipment by Express: Full Directions, Including the Words "Perishable! Rush!" are Stenciled on the Under Shell

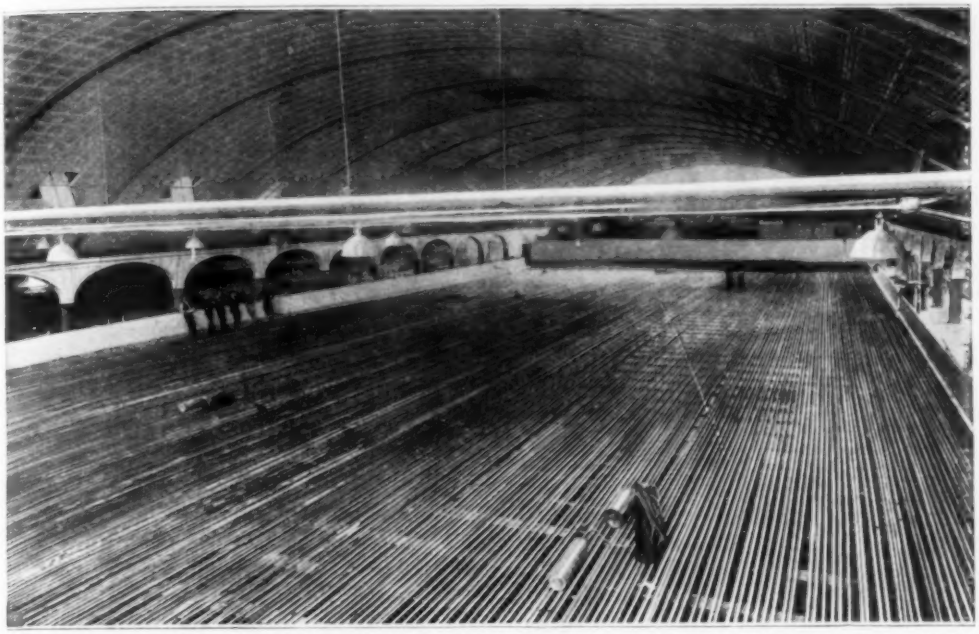
in soups and in some localities known as "mock" turtles. While almost every sort of living creature must be put in a crate for transportation, turtles are sent just as they are. Often they are in a weakened condition, but as a precaution they are turned on their backs when not being watched. No tags are necessary as all the shipping directions can be stenciled on the spacious backs or under shells of the creatures.

SCIENTISTS SEEK TO CLEAR MYSTERY OF KING'S DEATH

To modern science has fallen the problem of solving the two-century-old mystery shrouding the death of Charles XII of Sweden. The remarkable career of the ruler, who was known both as the "young lion of the north" and as the "madman of the north," fills one of the most romantic pages of European history. But the story of the climax of his life has always been blurred. He met his death in December, 1718, during the war with Norway. A ball pierced his skull in the midst of the fighting before the fortress of Fredriksten. Whether the missile was hurled from a Norwegian gun, or fired by an assassin within his own lines, has never been determined to the complete satisfaction of many historians. So his slaying for generations has been acclaimed the work of a "dubious hand." According to one accepted version, however, the Swedish approaches had reached a point less than 300 yards from the fortification when Charles looked over the parapet of the first-line trench and was struck by a bullet.

A movement lately launched by a Swedish patriotic society is expected eventually to throw valuable light on the subject. The organization, with the sanction of the royal family, has put the question to a jury of experts for decision. The body of the king has been exhumed and examined by eminent surgeons and scientists who, with the aid of X-ray and other apparatus, have made a technical investigation upon which the ultimate findings will be based. The research is being conducted with great thoroughness and no known source of information left disregarded. Engineers have located supposedly the exact position where the Swedish lines were drawn at the time the king's last battle was raging, and have made careful measurements of the distance between the points where the enemy batteries were situated and the place where the king fell. Eventually an official statement of the investigating body's conclusions will be issued, but until that time nothing will be published regarding the opinions formulated.

It was late in July that the body was disinterred and laid in state in the famous mausoleum of Gustavus Adolphus at Stockholm. There it was viewed by Swedish nobility, army and navy authorities, and state officials. It is interesting that after 199 years, the body should be found in an almost perfect state of preservation.



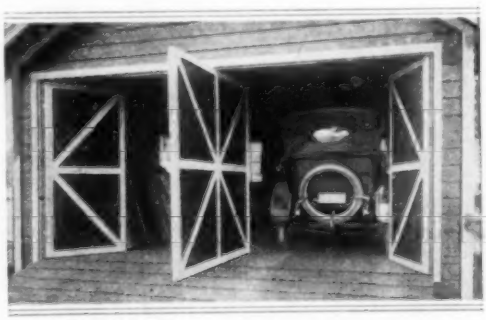
Ice Rink, Measuring 90 by 210 Feet, Showing the Floor Covered with 10 Miles of Refrigerating Pipe Which was Welded in Over 2,000 Places by the Oxyacetylene Process

OVER TWO THOUSAND WELDS IN SKATING-RINK PIPE

To make every joint in 10 miles of pipe leak-proof and trouble-proof after it was buried in ice, was the problem that was successfully solved by the builders of an ice-skating rink in San Francisco. In many such rinks where ammonia systems are used, screwed fittings have caused trouble, and so it was decided to weld the joints by the oxyacetylene process. The floor which was covered with this pipe measured 90 by 210 ft., and the welded joints numbered over 2,000. After several months of use no leaks have developed in the 10 miles of tubing. It is asserted that the cost per joint was approximately the same as the cost of ordinary screw fittings.

CONVENIENT DOORS FOR A DOUBLE GARAGE

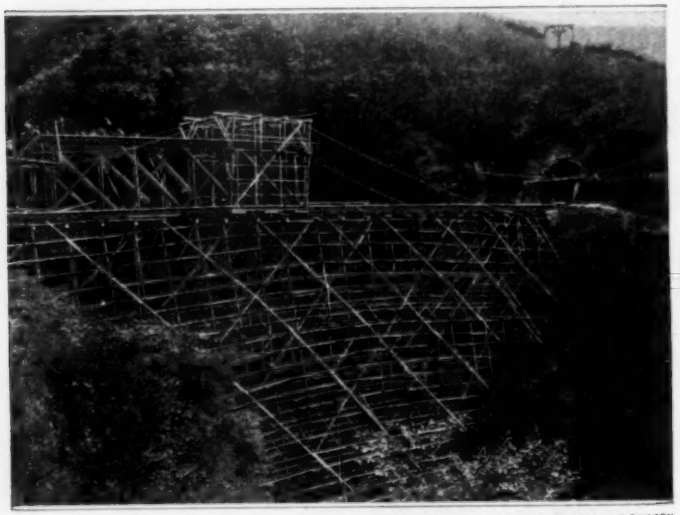
An automobile owner of Port Townsend, Wash., has recently built a double garage after his own plans, with a set of doors of interesting design, which are not only convenient and easily operated, but also neat and pleasing in appearance. The doors, which are being patented, are in three sections, those at the sides being hung like ordinary doors, while the central section, equal in width to the two others combined, swings on pivots secured in sockets placed at the top and bottom of the building. When open or closed, the swinging door is firmly held by sliding bolts that fit into sockets in the floor. The automobiles can readily pass on either side. When closed, the doors are secured from within by wooden bars.



Handy Set of Doors for a Double Garage, Designed by the Owner and Built by His Son and a Boy Friend

BAMBOO USED IN BUILDING RAILWAY BRIDGES

In Japanese railway-construction work bamboo is used for many purposes. It even serves for the false or temporary work required in bridge building, as illustrated in the case of a railway bridge in course of construction across a ravine in a wooded region in Japan. The heavy steelwork of the bridge was placed in its permanent position by means of a temporary supporting structure of bamboo, built up with infinite labor from the bottom of the ravine to the level of the roadbed on either side. The laying of the steel floor beams was then a comparatively easy matter. As bamboo is classed by botanists as a grass, its use in bridge construction seems odd, but it combines strength with lightness and is rendered capable of supporting heavy strains.



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Japanese Railway Bridge being Built on a Falsework of Bamboo: The Useful "Grass" is Also Used for Scaffolding to Raise the Heavy Steel Beams to Place

MINERS USE HEAVY LEVER IN DUMPING ORE CARS

Although it is, perhaps, crude in construction, an arrangement employed at a certain small mine for discharging ore cars at the dump, is nevertheless efficient. It is merely an application of the time-honored principle of the lever. A timber framework spans the end of the track that extends to the dump. To the crossbar of this, a heavy pole, carrying at its outer extremity a stanch chain, is pivoted. A hook connected to the chain fits into a steel eye provided on the rear of the car. The operation is obvious.

Tipping an Ore Car and Discharging Its Contents on the Dump, with the Aid of a Powerful Lever

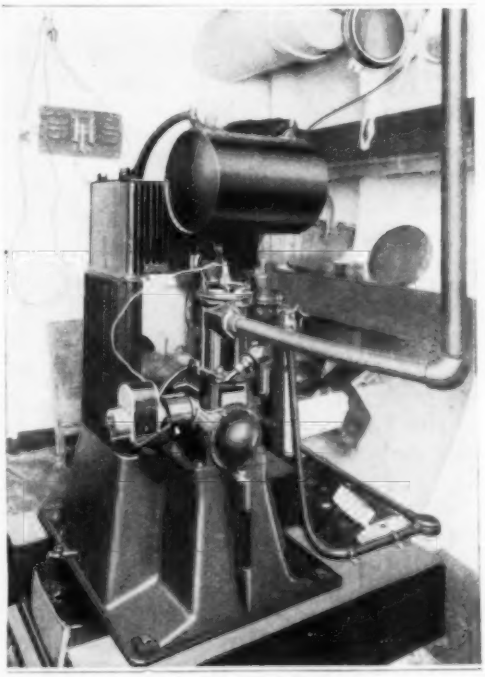
LIGHT PLANT MODERNIZES SAILING VESSEL

Plying the Pacific is a handsome, four-masted sailing vessel—engaged for the most part in carrying precious war-time cargoes of oil and gasoline—that has taken on a new lease of life. Up to a short time ago this boat, known as the "John Ena," was forced to pay burdensome insurance rates when laden with combustible material, for it was lighted with oil lamps. As every marine-insurance man knows, such a vessel may suffer disaster because of overturned lamps when there is no danger from storm. But this big hazard was removed by providing a simple electric-light plant, which also

The "John Ena" Which Plies the Pacific with Oil and Gasoline Cargoes: By Supplanting the Craft's Oil Lamps with a Simple Electric-Light Plant, Insurance Charges were Reduced Enough the First Voyage to Pay for the New Outfit

furnishes power for the sewing machine used in mending the sails. The reduction in insurance charges for the first voyage after installing the new lighting system far exceeded the entire cost of the plant. What has been done on this attractive - looking sailing ship only serves to indicate how large numbers of craft can be modernized to supply the present extraordinary demands for ocean-going vessels.

The outfit on the "John Ena" uses no storage batteries and has no complicated switchboard. It consists of a single unit, standing 45 in. high and occupying 24 by 25 in. of floor space. An especially designed engine of the sleeve-valve type drives the generator, which is also made after a special pattern. The rated capacity of the engine is 500 watts at 110 volts, direct current, but it can take a generous overload. A muffler, and other features, make its operation noiseless.



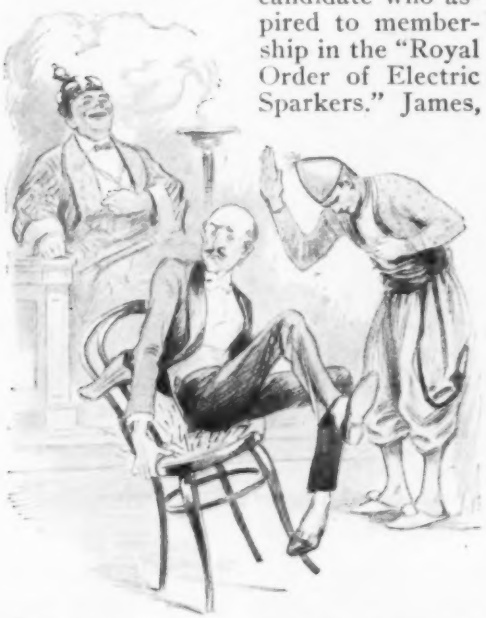
The Ship's Smooth-Running Light and Power Plant: Its Rated Capacity Is 500 Watts at 110 Volts. No Storage Batteries are Used

THE ELECTRIC INITIATION OF JAMES JOSEPHUS

The Royal Order of Electric Sparkers Tries Out Some of the Recent Apparatus Devised for the Entertainment of Lodge Candidates

By SEARLE HENDEE

IT turned out to be a prickly evening for James Josephus, the uninsulated candidate who aspired to membership in the "Royal Order of Electric Sparkers." James,



"No sooner had he touched the chair than he sprang wildly, and most ungracefully, into the air, emitting an irrepressible whoop."

a graduate of the "Pole Climbers' Long-Distance School," was a rank amateur, but nevertheless eligible for admission to that semiprofessional and highly unbenevolent organization.

The neophyte looked upon the occasion with the utmost solemnity. To the efficient team of "royal brothers" to whom the rough work of his initiation had been entrusted, however, there was nothing particularly sublime or august about the approaching ceremony. On the contrary, the night was dedicated to Puck.

James Josephus was ushered into a large room where many of the exalted members of the R. O. of E. S. were assembled. He was greeted jovially and offered a chair right beside the Grand Motorgul and past masters of the illustrious order. It was not an armchair such as some of the others lounged in, but a light, well-built chair with a cane seat, or what looked like one. As he seated himself he was conscious that all eyes were upon him and in another second he realized why, for no sooner had he touched the chair than he sprang wildly, and most ungracefully, into the air, emitting an irrepressible whoop.

"Entirely automatic," explained one of the royal brothers. "An exceedingly ingenious contrivance for public and private entertainments. The amount of current is not so great as to injure one, but sufficient to animate the most sluggish. You will be interested, no doubt, in its construction. Look it over. The wiring is cleverly concealed, you see, so that no one would suspect it to be an electric chair."

"Yes, deucedly clever," responded the candidate, "and a capable demonstrator of electrodynamic induction. Please, may I have a drink? The evening is becoming warm."

"Assuredly," replied a robed frater. "In honor of the occasion we have prepared some sparkling nectar which I am positive you will enjoy." He led the willing victim to a round table where a number of thirsty "electric

"His arms cramped and he strove vainly to drop the tingling ladle and glass. . . . 'Another of our unusual accessories,' explained a royal brother."

sparkers" had already grouped themselves about a large punch bowl.

"Ah, this, indeed, is a pleasure," exclaimed the aspirant, smiling with satisfaction.

"You will be delighted with it, I am sure," agreed his escort. "Just help yourself; we are very informal here."

James Josephus lifted the silver ladle and began to pour the deep-red liquid into a glass. But before he could smack his lips in anticipation of the refreshing draft, something happened. His whole body quivered, his face contorted, and he hopped on tiptoe at a rate that was astonishing. His arms cramped and he strove vainly to drop the tingling ladle and glass. Suddenly the overpowering sensation ceased, but the paroxysms of laughter that convulsed the spectators made his blood burn with chagrin.

"Another of our unusual accessories," explained a much-pleased royal brother. "It insures sobriety on all occasions. The bowl, you will observe, is of imitation cut glass and measures 7 by 16 inches. It comes well packed to guard against breakage. The interesting thing is that the special spark coil consumes only about one and a fourth amperes. It is very efficient."

"Yes, very efficient," agreed James Josephus. "The spark is very energetic — very — and excellently suited for high-frequency apparatus. It operates on dry cells, I suppose."

"You don't feel weak, do you?" questioned one of the brothers.

"No, indeed," James Josephus assured him. "To prove it I'll wager I can lift that 200-lb. weight, yonder, higher than any of you can." It was agreed upon, and all present gathered around the heavy-looking metal object, on top of which were two grips for the hands. One of the members tugged unavail-

"'Oh, the juice!' shrieked the amateur strong man. 'O ho! the juice!' shouted the entertainment committee. The weight dropped to the floor with a thud."

ingly and swore he could not budge it.

"Weakling," scoffed our hero. "I'll give you a demonstration of muscle," and he gripped the weight with both hands and began to lift.

"Oh, the juice!" shrieked the amateur strong man.

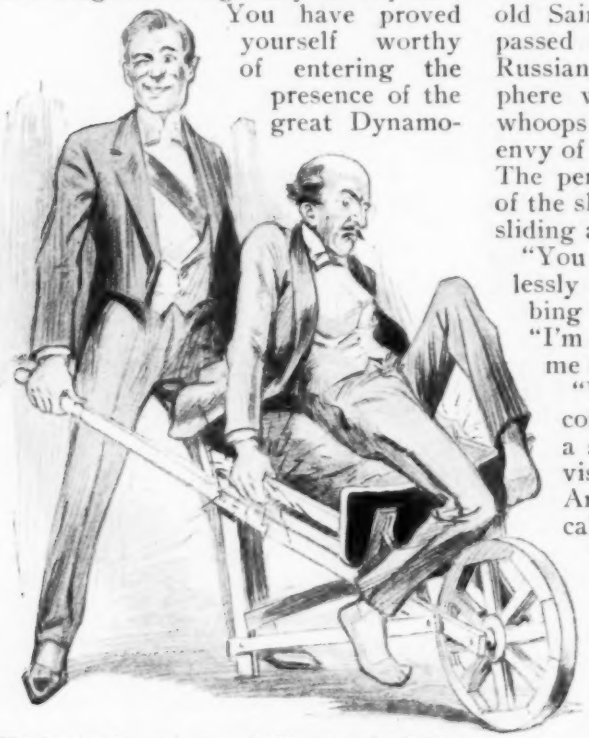
"O ho! The juice!" shouted the entertainment committee.

The weight dropped to the floor with a heavy thud. The novice rubbed his arms and gazed around in disgust. "What's the big idea?" he stammered. "Trying to make a fool of me?"

"You're sure the weight lifter 'round here," confided a solicitous member of the Electric Sparkers. "None of us ever tackles that thing, even if it does weigh only 40 pounds. But you are handy with the weights, all right. You sure got that one up."

"James Josephus put to shame old Saint Vitus himself and far surpassed the leaping skill of the agile Russian-ballet artists."

"Now, my fellow," said a voice, "we have laughed enough at your expense. You have proved yourself worthy of entering the presence of the great Dynamotorine—the exalted high priest of our high-voltage inner circuit—and to kneel before him on the magic carpet. To do so, however, you must remove your shoes and incase your feet in these royal sabots, made of wood taken from the first telegraph pole." And so it was that the expectant one slipped into Dutch shoes that would have doubled the speed of Mercury, had he worn them.



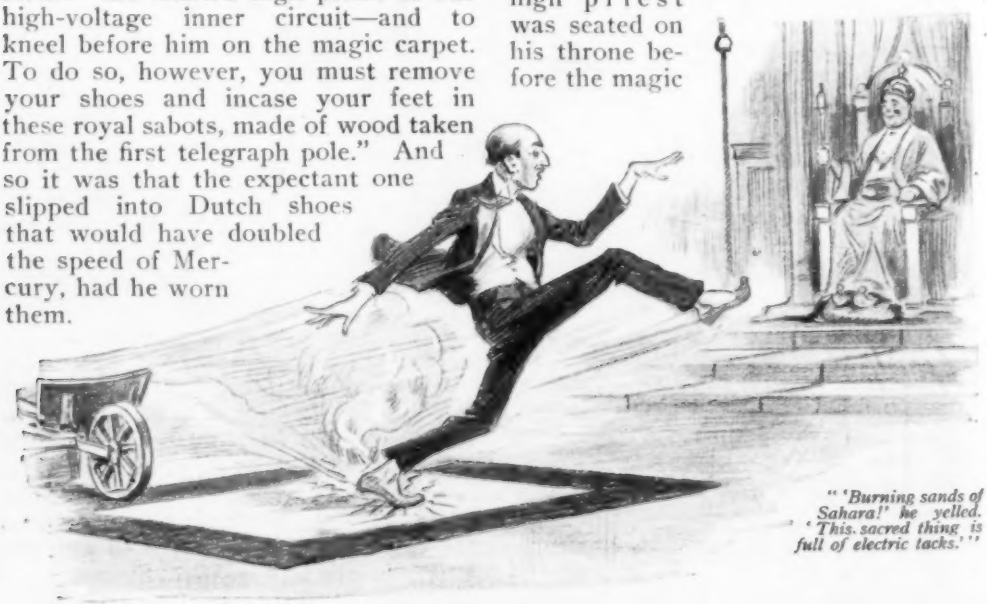
"So they put Jimmy in the wheelbarrow and rolled him into an adjacent room where the great high priest was seated on his throne before the magic carpet."

Then followed the most classic of dances. James Josephus put to shame old Saint Vitus himself and far surpassed the leaping skill of the agile Russian-ballet artists. The atmosphere was filled with blood-curdling whoops that would have excited the envy of the most scalp-craving redskin. The performance continued until one of the shoes became loosened and went sliding across the floor.

"You are a heartless crew," breathlessly complained the candidate, rubbing the soles of his smarting feet. "I'm on to you, now. You won't get me to walk another step."

"We won't ask you to," was the comforting reply. "You have had a strenuous time. But you must visit the exalted Dynamotorine. And to do that you cannot wear calfskin shoes. He won't have it. And besides, leather must never touch the sacred rug. Here, climb into this wheelbarrow and we'll ride you in, just for fun. Such an unconventional sight will please the old fellow immensely, I am sure."

So they put Jimmy in the wheelbarrow and rolled him into an adjacent room where the great high priest was seated on his throne before the magic



" 'Burning sands of Sahara!' he yelled. 'This sacred thing is full of electric tacks.' "

carpet. He clung tenaciously to the vehicle, determined to be prepared for eventualities. Then, suddenly, as they stopped before the sacred rug and the Dynamotorine slowly lifted his eyes ten billion demons assaulted the neophyte with as many needles. Balancing on his hands, he threw his legs into the air. The current shot on and off intermittently, and James became a human jumping-jack with no place to jump. When his limbs were in the air and free from the agonizing prickling, his hands shook with the piercing pain of the electric current. Then it ceased, and he arose quickly and jumped on the magic rug.

"Burning sands of Sahara!" he yelled as he danced energetically. "This sacred thing is full of electric tacks."

"Full of heating elements and amperes," corrected a "practical worker."

The last ordeal continued only a second, however, for James Josephus bounded off the electric rug in two marvelous leaps.

"Too bad, too bad!" consoled the great Dynamotorine, leaving his throne and approaching the proselyte. "They forgot to insulate the wheelbarrow and you should not have stepped on the mystic rug without protecting your feet with the royal sabots."

"Quite right, quite right," ejaculated the injured party. "If the current has been turned off, I wouldn't mind having some of that royal punch, I'm awfully warm."

"Surely," replied the high priest, "but first please climb the rope at the left and bring down my imperial fez which has been hung high out of the reach of moths."

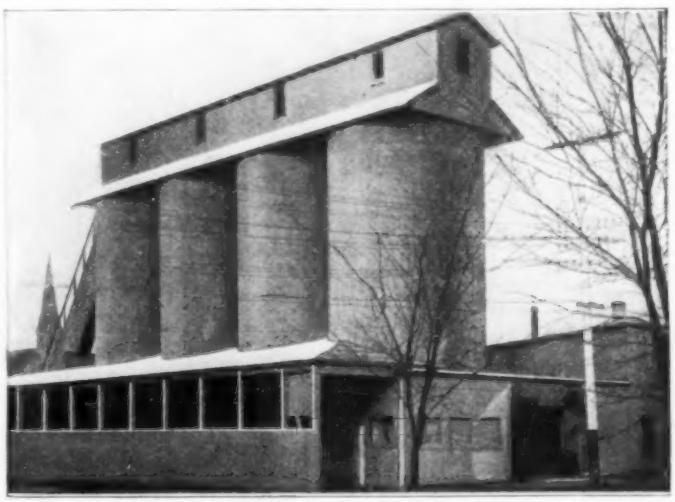
"I'm climbing no electric rope or live lightning rod tonight," avowed James Josephus. "I'm next to your spark coils and induction phenomena. I'm initiated!"

"Enter the fold!" shouted the others. "You have proved a good conductor. Now we will initiate you into the mysteries of the Royal Order of Electric Sparkers. Keen pleasure and a wonderful static display await you."

DEALER'S COAL BINS BUILT LIKE SILOS

Four big cylinders of concrete are the bins of an unusual type which a progressive coal dealer has provided to hold his supply of fuel. Each of these silolike reservoirs is 18 ft. in diameter and 50 ft. high, and has a capacity of 1,400 tons. They are filled by an electrically driven conveyor which discharges the fuel into the top. Extending over the four bins, is a single wooden roof which houses the hoisting machinery. False bottoms, 6 ft. above the ground, permit wagons to be driven directly beneath the reservoirs so that they can be loaded by gravity.

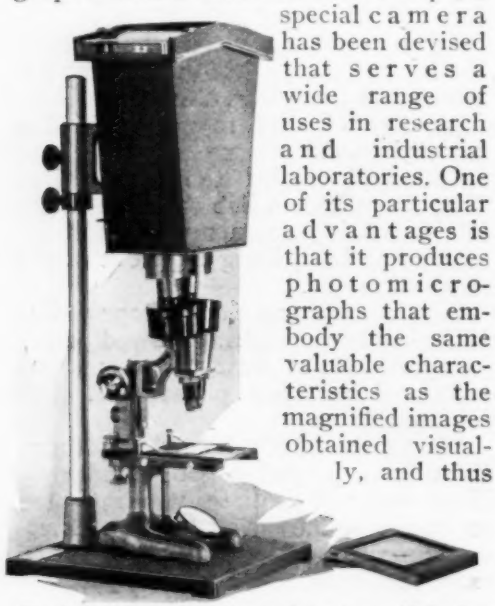
Everything about these big bins bespeaks unusual neatness and thrift.



Coal Bins of an Unusual Type: These Cylinders Are 18 Feet in Diameter, 50 Feet High, and Each Has a Capacity of 1,400 Tons of Fuel

STEREOSCOPIC CAMERA MADE FOR BINOCULAR MICROSCOPE

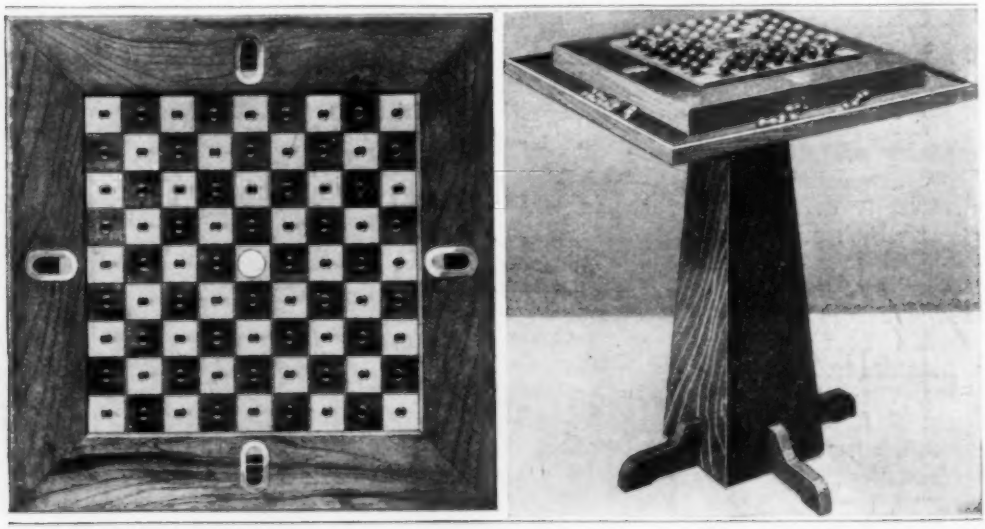
For making stereoscopic photographs with a binocular microscope, a special camera has been devised that serves a wide range of uses in research and industrial laboratories. One of its particular advantages is that it produces photomicrographs that embody the same valuable characteristics as the magnified images obtained visually, and thus permits permanent records of the most favorable nature to be made. The camera is double—its two halves separated by a partition—and arranged so that the ground glasses are in normal relation to the axes of their respective optical systems. It has a 10-in. projection distance, a length that gives magnifications identical with those obtained in visual work with the microscope. To provide a light-proof connection between the two instruments and at the same time afford freedom of movement for focusing, metal adapters are used which slip over the eyepieces of the microscope and fit into the corresponding tubes attached to the front board of the camera.



The New Camera Enables a Scientist to Make Permanent Records that Have Perspective, Depth, and Proper Form

BOTH CHANCE AND SKILL ENTER INTO NEW GAME

Among the new indoor games that have been devised for home and club is one which embodies, in a modified way, some of the elements of roulette and chess. It is a light diversion, requiring enough thought to keep interest alive and involving sufficient chance to make the complexion of a contest change constantly, so that speculation is always rife. Action is introduced at the beginning and prevails to the end, for the path to victory is the path of greatest danger. A feature which popularizes the pastime is that it may be



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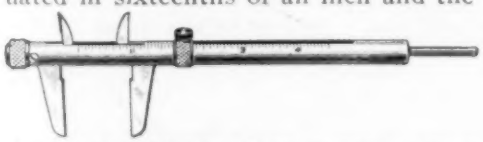
Showing the Character of the Board Used for the New Game, and the Way It is Set

enjoyed by two, three, or four persons, each of whom is given 14 men, five kings, and one crown, the latter being the most important piece. A color wheel, incorporated in a checkerlike board on which the game is fought, is spun before each play. It indicates the move to be made, what color of square one may move from, how many spaces may be passed, and what color of square one may move a man over and on. There are, however, from two to eight ways in which a move may be made. It is the method of execution that tests the player's cleverness.

NEW UNIVERSAL CALIPER FOR SMALL WORK

A caliper of a new type which can be used for making any inside, outside, or depth measurement up to 4½ in., consists of a slotted bar through which two movable jaws project transversely. One side of the tool is graduated in sixteenths of an inch and the



A Caliper for Making Any Inside, Outside, or Depth Measurement up to Four and One-Half Inches or 11½ Centimeters

other in millimeters. A thumbscrew locks the movable parts as desired.

MOTORING TAUGHT IN CAR WITH DUAL CONTROL

Two sets of controlling devices constitute a feature of a new car which has been built for use in teaching persons how to drive automobiles. With a car of this sort the principles of motoring may be learned quickly and without danger of mishap. There are two sets of clutch and brake pedals, two accelerators, and two steering wheels. The latter are connected by an endless chain which passes around a cogwheel located beneath each steering wheel, so that the two move in unison. The single-gear shift is centrally located and can be operated by either person in the front seat. It is thought that there will be a considerable demand for cars of this type

Car in Which Instruction is Given in Motor Driving: Danger of Accident is Practically Eliminated by the Use of Two Sets of Controlling Devices

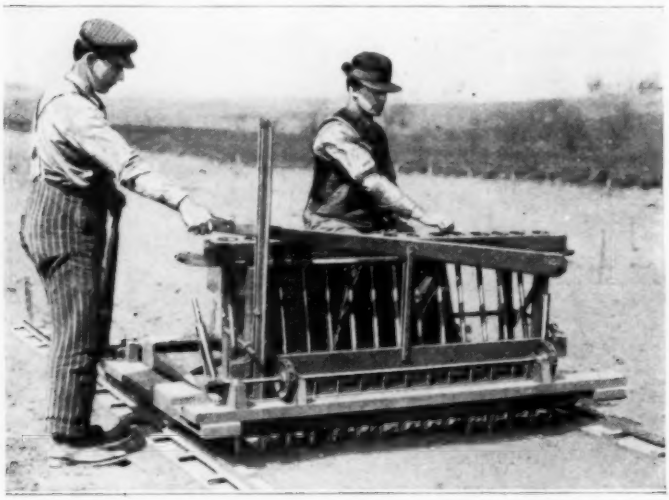
when additional drivers are needed to take the place of those entering war service.

NEW GREASE CUP HAS NOVEL AND CONVENIENT POINTS

Two distinctive features are incorporated in a grease cup lately designed. A four-sided post is anchored in the base of the device, while fixed at the top in the middle of the cap there is a spring seat, or socket, to receive it. The arrangement overcomes the difficulty often encountered in screwing a cup together, for the post centers the two members instantly. The springs press against the sides of the upright bar and prevent the cap from becoming loose and falling off.

DEVICE USED IN PLANTING GRAIN BRED FOR SEED

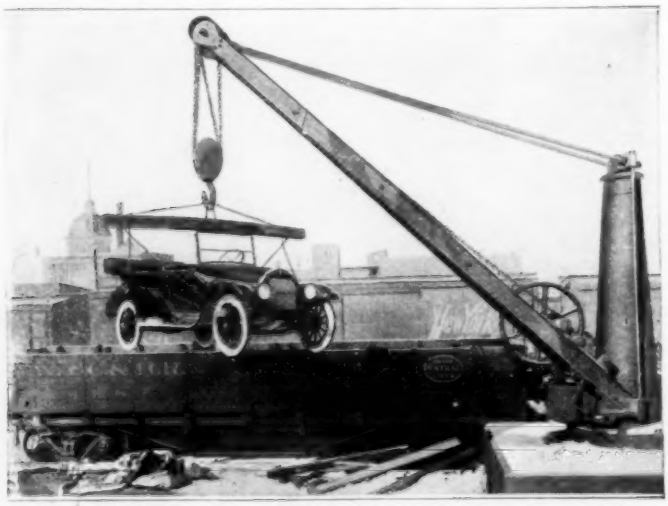
The absolutely uniform planting so necessary for the proper development of high-grade grain seed, is accomplished at the State Agricultural Experiment Station of Wisconsin with the aid of a novel planter. This machine runs on a track and is operated by two men, one of whom deposits the seeds in 14 uniformly spaced planting spouts that lead down into the soil. The second man operates a "covering" lever which in turn actuates rods which thrust the grains into the ground to the proper depth. A second lever is used to propel the planter forward the proper distance—in the case of barley, 4 in. at a time. Beginning with a thousand, or more, selected kernels, beds are planted in this manner for several consecutive seasons, the seed each time being selected from a few of the finest plants of the previous year.



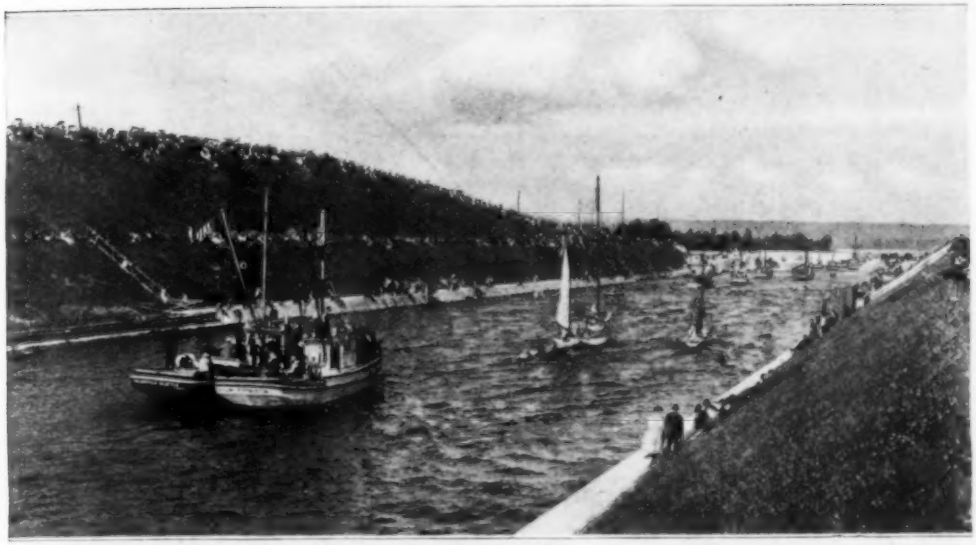
Machine Used in Planting Selected Grain for Seed Purposes: The Seated Operator Deposits the Seed in the Vertical Spouts, and the Other Operates a Lever Which Thrusts the Kernels into the Ground to a Uniform Depth

SIMPLE UNLOADING TACKLE FOR AUTO DEALERS

The feature of the tackle illustrated herewith, which is used by automobile dealers in unloading automobiles from gondola cars, is its simplicity. A single heavy scantling and some rope constitute practically all the material used. The rope is looped about the beam at either end and then tied to the front and back wheels. Additional rope is looped about the center and around the ends of the beam so that a crane can easily pick up the tackle and the load to which it may be attached. To prevent marring, the rope is padded at points where it comes in contact with the car. Proper adjustment keeps the car from tilting.



Simple Tackle for Lifting Automobiles from Gondola Cars: At the Points Where the Rope Touches the Car, Padding is Employed to Prevent Marring



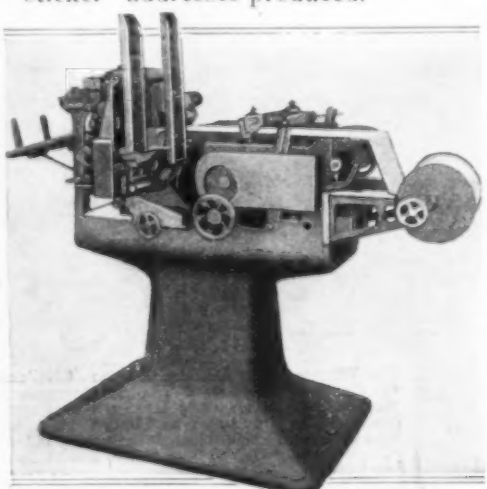
Scene at Formal Opening of the Canal Which Gives Seattle a Great Fresh-Water Harbor: The Waterway Is Five Miles Long, Cost $5,000,000, and Connects Two Lakes with Puget Sound, Thereby Giving a Vast Additional Area Direct Access to the Sea

SEATTLE'S SHIP CANAL FORMALLY OPENED

The fondest dream of the city of Seattle, Wash., was realized, after many years of waiting, when the $5,000,000 Lake Washington Canal, which cuts through the north end of that city, was formally opened a few weeks ago. The waterway is five miles long and, by connecting two lakes with Puget Sound, opens up a vast industrial area which is destined to make Seattle one of the greatest ports on the Pacific coast. In celebration of the opening, a marine pageant was held in which thousands of craft participated. The building of the locks in this canal, and other features of it, have been described in Popular Mechanics Magazine.

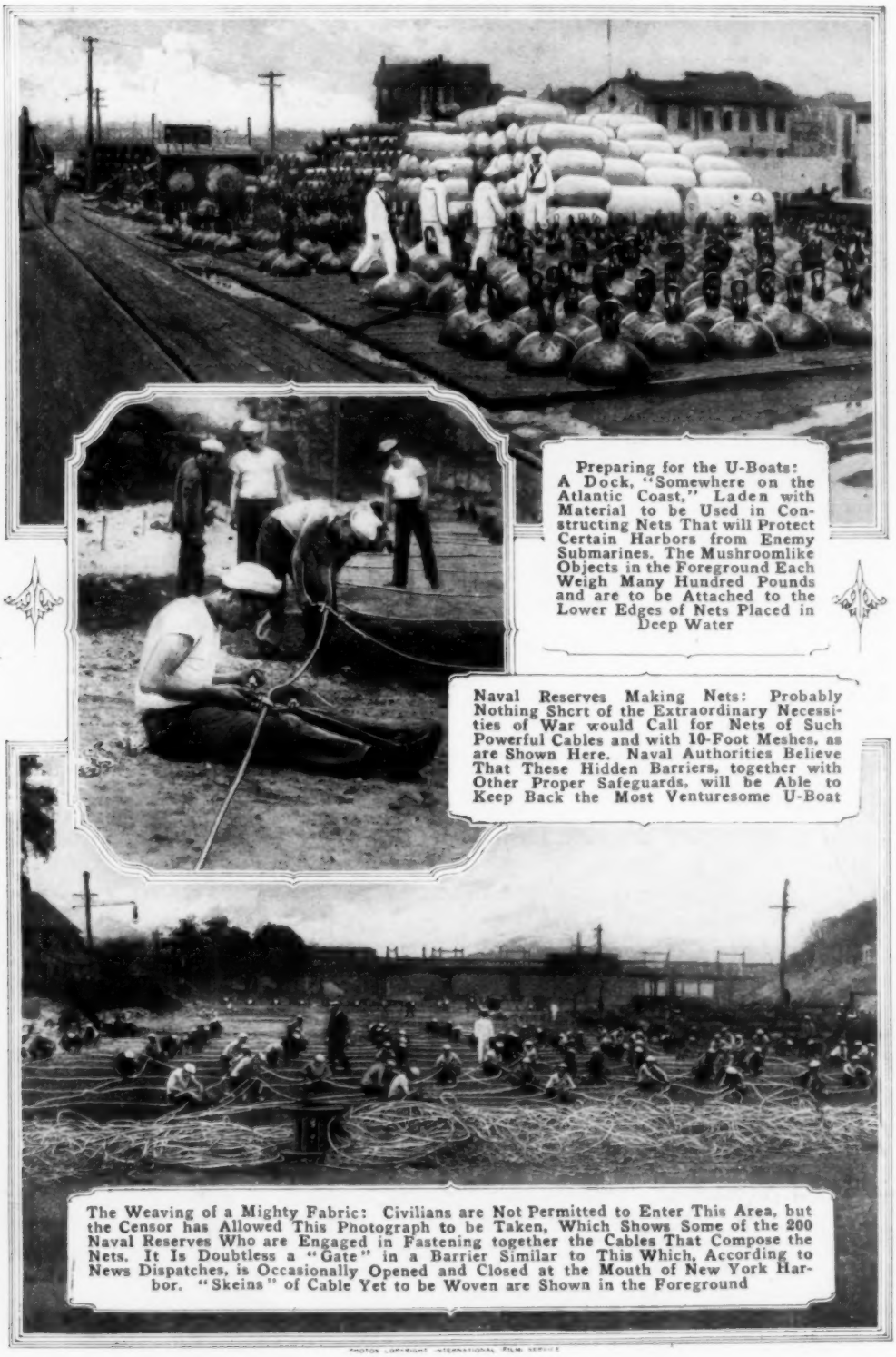
CIRCULAR-LETTER PRINTER MAKES OWN STATIONERY

For turning out form letters in large quantities, a machine has been developed that not only does the work usually accomplished by devices of the kind, but does a number of other things at the same time. It prints letterheads in color, stamps signatures in another shade of ink, automatically changes the name, address, and salutation of each copy, gives the body of the letter a typewritten appearance, and lastly, cuts the paper into 11-in. lengths. Thus it makes the stationery in the same operation that the letter is printed. Paper is fed to the machine from a roll, 8½ in. wide. If the stock is embossed or lithographed an automatic sheet feed is used. Post-cards are printed and addressed, wrappers directed, and, with an attachment, "sticker" addresses produced.



New Form-Letter Machine that Performs a Wide Range of Operations

WEAVING MIGHTY NETS TO FOIL THE U-BOATS



Preparing for the U-Boats: A Dock, "Somewhere on the Atlantic Coast," Laden with Material to be Used in Constructing Nets That will Protect Certain Harbors from Enemy Submarines. The Mushroomlike Objects in the Foreground Each Weigh Many Hundred Pounds and are to be Attached to the Lower Edges of Nets Placed in Deep Water

Naval Reserves Making Nets: Probably Nothing Short of the Extraordinary Necessities of War would Call for Nets of Such Powerful Cables and with 10-Foot Meshes, as are Shown Here. Naval Authorities Believe That These Hidden Barriers, together with Other Proper Safeguards, will be Able to Keep Back the Most Venturesome U-Boat

The Weaving of a Mighty Fabric: Civilians are Not Permitted to Enter This Area, but the Censor has Allowed This Photograph to be Taken, Which Shows Some of the 200 Naval Reserves Who are Engaged in Fastening together the Cables That Compose the Nets. It Is Doubtless a "Gate" in a Barrier Similar to This Which, According to News Dispatches, is Occasionally Opened and Closed at the Mouth of New York Harbor. "Skeins" of Cable Yet to be Woven are Shown in the Foreground

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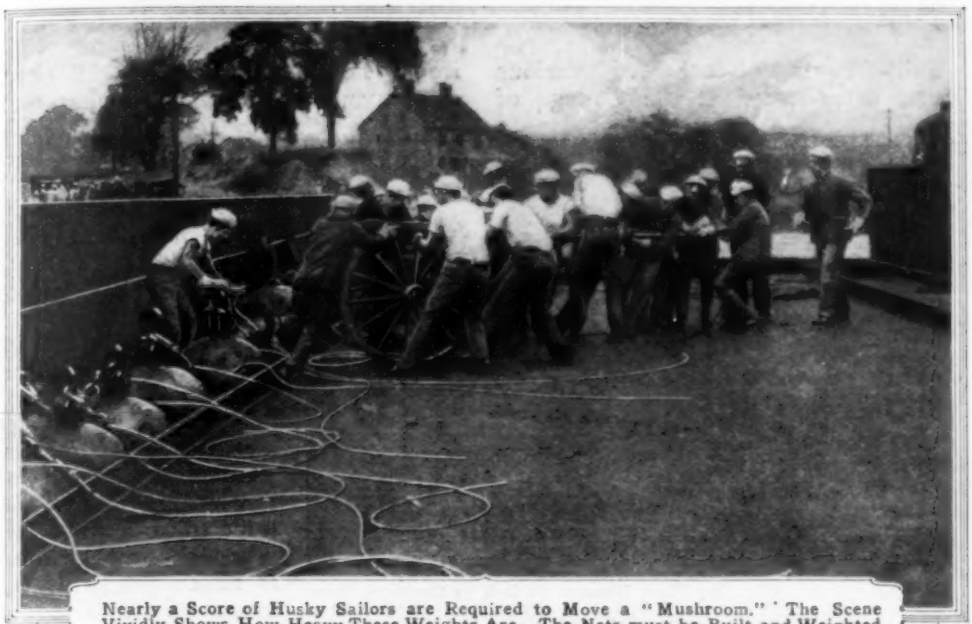
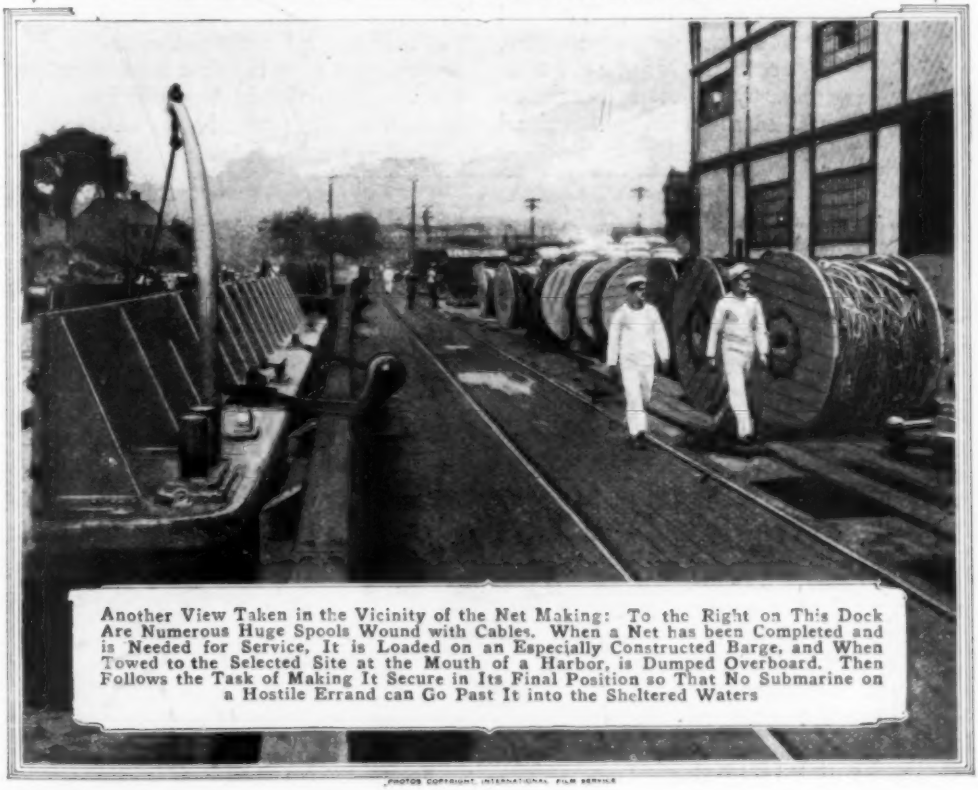
AND KEEP OUR HARBORS SAFE FROM ATTACK



Nearly a Score of Husky Sailors are Required to Move a "Mushroom." The Scene Vividly Shows How Heavy These Weights Are. The Nets must be Built and Weighted to Withstand Not Only Possible Attack but Also to Remain in Place in Spite of the Terrific Strain that Storms and the Tide may Produce. The Long "Tails" Attached to the Tops of the Big Hemispheres are Used to Tie Them in Place on the Under Edges of the Nets. Creosoted Barrels are Attached to the Upper Edges to Serve as Floats



Another View Taken in the Vicinity of the Net Making: To the Right on This Dock Are Numerous Huge Spools Wound with Cables. When a Net has been Completed and is Needed for Service, It is Loaded on an Especially Constructed Barge, and When Towed to the Selected Site at the Mouth of a Harbor, is Dumped Overboard. Then Follows the Task of Making It Secure in Its Final Position so That No Submarine on a Hostile Errand can Go Past It into the Sheltered Waters

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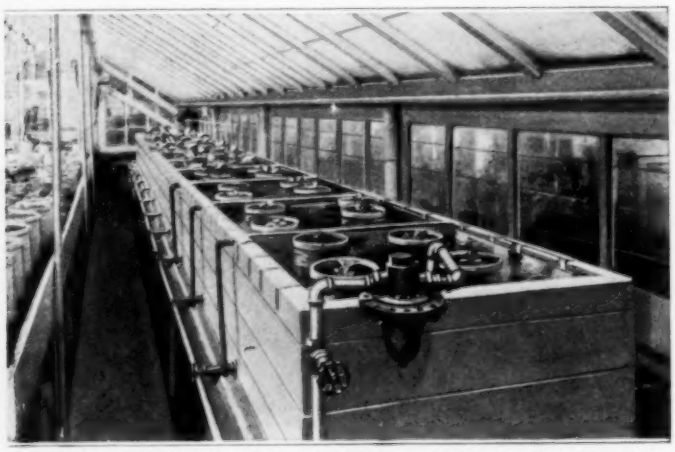
NEW REGULATOR FOR SOIL-TEMPERATURE TEST

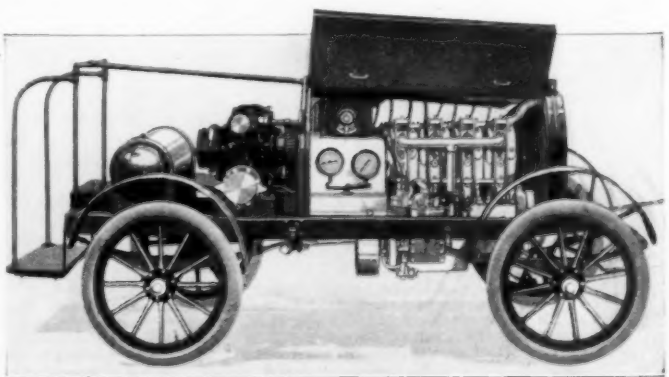
Soil-fungus diseases of various plants are studied at the College of Agriculture, University of Wisconsin, by means of a new apparatus devised by specialists of the faculty. To hold soil at constant degrees of temperature, a tank regulator, 30 ft. long, was constructed of heavy planks insulated with felt and lined with galvanized iron. This is divided into 12 equal compartments, or small tanks, each having suspended in it four 10-qt. "batteries," or metal jars, filled with soil in which the plants to be tested are set. Water connections are provided at one end of the tank, steam and electric connections at the other end. Continuous-flow outlet and bottom drain pipes are also installed. In experimenting, cold water is turned into the tank until it is filled, when the temperature is raised gradually by means of steam tubing and electric-light bulbs suspended in the water, until it varies from about 45° F. at one end to about 90° at the other. These temperatures are maintained constantly, and regular inspections give reliable data of fungus-disease growths in the soil jars. The apparatus has proved very satisfactory.



Special Apparatus for Testing Plant Diseases in Soil at Constant Temperatures in Use at the Wisconsin College of Agriculture: The Jars Seen in the Tank Compartments Contain Soil and Plants under Observation

FIRE-PUMP UNIT CARRIED ON LIGHT TRAILER

One of the latest fire-fighting appliances is a motor-driven pump mounted on a light four-wheel trailer. Its moderate cost and apparent efficiency quite probably adapt the unit to the needs of many small communities that maintain limited equipment. It is provided with a four-cylinder, 30-hp. motor, and at a pump pressure of 135 lb. delivers 410 gal. of water a minute. Because it is a trailer, the cost of taking it to a fire is practically nothing. One man is able to operate it without assistance.



Novel Trailer "Fire Engine" of Low Cost That may be Operated at Moderate Expense by Small Municipalities and Suburban Communities

Picnic Luncheon Tables on Site of a Big Tree That Flourished Many Centuries Ago: Its Descendants of the Third and Fourth Generations Surround the Spot

BIG-TREE CHILDREN OF THE FOREST

The California redwoods, the big trees of the coast range, are gregarious, reproducing and thriving in families, often located in strictly limited areas or patches. These patches are seldom decimated by fire, because of the asbestoslike nature of the thick bark.

However, after the trees attain an age of two or three thousand years or so, a sort of senility seems to result from the accumulation of diseases, insects, accidents, and storms, and the parent stem perishes. Also, before their protection in national-monument reservations, woodmen destroyed the big trees for timber.

Promptly upon the death or removal of the tree, numerous sprouts burst forth from the roots close around the base of the stump; and unlike its distant hardwood relative of the eastern states, which starts a score of sprouts and molts all but one or two, all the redwood sprouts grow in complete harmony, like an ideal family of children. Symmetrically disposed around the parent position, these offspring command attention for their beauty.

There are traces of many large circular clusters of trees whose original ring was so large as to indicate the present generation to be great-great-grandchildren, if not the children in the sixth generation from the central stem, whose era probably dates back nearly to the glacial period of ten thousand years ago.

The picnic ground seen in the accompanying view is formed by a circle of great-grandchildren of a missing tree, apparently not a single first child or grandchild remaining. These great-grandchildren trees are approximately 100 years old.

COUNTING THE BALLS IN FILLING SHRAPNEL

How many balls in a shrapnel, and who counts them? The number of balls varies with the size of the shrapnel, and, anyway, the vital consideration is not one of number of balls, but entirely a matter of correct weight. The size of the bullets varies slightly and there is also slight unavoidable variation in the weight of casings, and other parts.

An eastern company, which makes 3-in. Russian shrapnel, has devised a very simple but perfectly satisfactory

machine for counting balls and filling the shrapnel.

The balls come from a large tank, not shown in the picture, which is

COURTESY OF MACHINERY

Filling Shrapnel in a Modern Munitions Plant: An Ingenious Arrangement Releases the Correct Number of Balls at Each Operation

located near the ceiling, and slide down the inclined pipes to the smaller storage tanks forming parts of the counting machines. Two distinct counting processes are then undertaken. In the first process, 90 balls are dropped into the casing. They are automatically counted in this way: From the base of the small storage tank, shown in the illustration directly in front of the operator, runs an inclined raceway. This raceway is divided into ten little channels and a gateway is built across it at a distance from the base of the storage tank equal to the diameter of nine balls. The operator opens the gate at the base of the little reservoir and enough balls run out to fill each of the ten channels with nine balls; that is, 90 balls run out. Then the operator closes that gate and opens another, and these 90 balls drop into the shrapnel case. While they are dropping, the case is being mechanically joggled continually. The partly filled shrapnel is next taken to a hydraulic press, where it is subjected to a three-ton pressure.

At the second counting machine, by an exactly similar process to that used in the first part of the operation, 150 balls are added. A charge of smoke-making powder is then added and the whole shrapnel weighed. A certain exact weight has to be attained and it is often necessary to add a few more balls in order to get this desired result. With the weight correct, the filled case is again subjected to a three-ton hydraulic pressure.

CAMP-FIRE PERMITS ISSUED IN FOREST RESERVATION

In an endeavor to obtain coöperation and thus minimize the danger of costly conflagrations, a ruling has been made that requires campers and hunters to procure permits before building fires for any purpose in the Angeles National Forest, Calif. The system has been in force since last spring, and seems to be working satisfactorily. Permits are issued by all forest officers free of charge. They remain in effect only between dates indicated in writing, and specify a list of conditions which must be observed. For instance, only small fires are allowed, and these must be built in the open, at least 20 ft. from standing brush, and not against a tree or log. Leaves and trash must be removed from around the place where the fire is to be kindled. A fire must never be unattended, even for a short time. Before it is left, it should be extinguished with water and covered with fresh dirt. The back of the permit lists general precautions that should be observed when one is in the forest, and also gives instructions for notifying rangers of a fire, should one be discovered that is too big to extinguish without additional assistance. All the rules are so fair that any good sportsman will observe them voluntarily.

¶By a recent decree of King George of England, the descendants of Queen Victoria who are subjects of Great Britain have been ordered to discontinue the use of all titles, degrees, etc., of German origin, and hereafter the English royal house will be known as the house of Windsor.

Testing a Pair of Pontoons before Installing Them

Left: Constructing a Section of the Double Platform for Large Raft

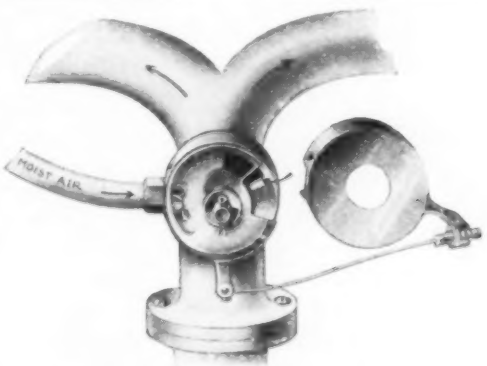
Right: Two of the Completed Life Rafts Ready for Service

LIFE RAFTS PLACED ABOARD TRANSATLANTIC SHIPS

For the safety of those aboard, life rafts are being carried, in addition to the usual small boats, by some of the American vessels that are running the gauntlet of Germany's submarines. The devices are of different designs and sizes, but one fairly common type is built with two stanch wooden platforms, 13½ ft. long and 9 ft. wide, placed one above the other, and separated by air-filled pontoons that extend along the sides. Such a raft is capable of supporting 20 or more persons and weathering a heavy sea. The cylinders are made in sections so that if one of them becomes punctured, or springs a leak, only part of its buoyancy is lost. Although it is possible for such a raft to be capsized, there is little danger of it.

MOTOR APPLIANCE DESIGNED AS FUEL ECONOMIZER

For water-cooled pleasure cars and trucks, a valve has been devised which permits moist air or vapor to be introduced into the engine cylinders. The effect of this is to reduce fuel consumption, prevent carbon deposit, and cool the motor. According to reported, but unofficial tests, the saving of gasoline amounts to 25 per cent, or more, for certain light cars. To install the device, the intake manifold is tapped above the carburetor. A copper tube extends from it to the top of the radiator, while, to permit regulation, a flexible cable, reaching to a convenient point on the steering column, is supplied. After the motor has been warmed up, the valve is opened slightly. Suction causes moisture or steam to be drawn in from the upper part of the radiator. Because of its simplicity, there is little danger of the device failing to operate so long as the connections are tight. It is claimed that, besides increasing mileage, the device reduces the carbon nuisance and cools an engine without chilling it.

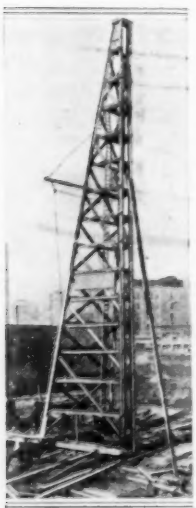


Showing Installation of Fuel-Saver, Which is Said to Cool an Engine and Eliminate Carbon

Collision Which Was Remarkable in That It Occurred Just at the End of a Signal Block: One Train Entered One Block Only Five Seconds Later Than the Other Entered the Adjoining Block. Both Trains were Drawn by Two Engines

DRIVERS OF RECORD HEIGHT SINK LONG PILES

Two of the tallest pile drivers ever employed have been used in connection with the foundation work for a new general office building that is being erected in San Francisco by one of the railway companies. The site of the structure is on filled ground, a fact that made it necessary to sink 2,285 piles, varying in length from 115 to 125 ft. Each of the drivers measures 133 ft. from its sill to the under side of its headblock.



HEAD-ON TRAIN COLLISION AT END OF SIGNAL BLOCK

A recent head-on collision of two freight trains has few parallels in railway history in that it occurred at the point where two block signals were located to mark the division between two blocks on a track which was used for trains traveling in opposite directions. The two trains met almost exactly at this deadline, because one entered one block only five seconds after the other had entered the adjoining block. Other factors contributing to the accident were the facts that the dispatchers' orders were defective and that a heavy fog obscured the right of way. Each train was drawn by two big locomotives. Two men were slightly injured in the crash.

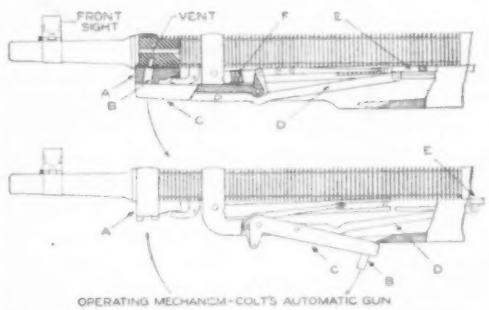
NEW AUTO LOCK HAS ALARM AS AN ADDED FEATURE

A thick triangular block, to which a strong U-shaped metal member is attached, constitutes a new type of automobile lock. To protect a car the U-shaped part is clasped about the tire and rim of a front wheel, and then the two parts are snapped together like a padlock. A key unlocks it, but if it is tampered with, a gong begins to ring.

THE DEADLY MACHINE GUN

By REGINALD TRAUTSCHOLD, M. E.

THE wonders of modern artillery are by no means limited to the big siege guns, heavy fieldpieces, and other mighty weapons. These represent but one phase of artillery development and one which, deadly and destructive as these guns have proved to be, can be comprehended, in part at least, by the layman, even though "service in France" may be necessary to bring a full realization of the devastation wrought by these big fellows. The imagination can more readily conceive guns of large caliber throwing tons of shrapnel or high explosive shells than it can grasp the picture of the deadly, belt-fed, automatic machine guns—the Maxims, the Vickers, the Benet-Mercies, and the Colts—which are capable of discharging hundreds of small-caliber cartridges per minute, or one cartridge at a time, if desired, or of concentrating a rapid succession of any number of shots at any instant. Yet the story of the progress of the great war has been sharply punctuated by the achievements of these fire-spitting little arms, with which charges are prefaced and assaults broken down. Wonderful little mechanisms they are, indeed, but in reality, not very complicated, at least so far as their principle of operation is concerned.



OPERATING MECHANISM—COLT'S AUTOMATIC GUN

In the Upper Drawing the Gas Lever is Shown in the Closed Position, While in the Other Diagram It is Thrown to the Rear and the Retracting Springs Compressed. A, Gas Cylinder; B, Piston; C, Gas Lever; D, Gas-Lever Connection; E, Slide; F, Retracting Springs

The one most difficult task in connection with automatic guns is to keep the fiery little weapons cool, for the rapid fire these guns are capable of sustaining naturally results in rapid and serious overheating. For carrying off some of the heat, most machine guns are therefore surrounded by jackets in which water is caused to circulate. This necessitates a supply of water, suitable connections, etc., and reduces the mobility of the gun. There is one exception to this arrangement, however, among the successful guns, and that is the Colt. The Colt differs from other belt-fed automatic guns—that is, guns in which the cartridges are carried and fed to the guns on long belts—in that it is air instead of water-cooled, and therefore of somewhat simpler construction. This air cooling is decidedly an advantage.

Briefly, the operation of the Colt automatic gun, which is typical of belt-fed machine guns in general, is as follows: Near the muzzle of the gun there is a small hole, known as the "vent," extending through the under side of the barrel to the bore. Right under the vent is a "cylinder," through which a larger hole extends to the vent in the barrel. Prior to the discharge of a cartridge—in fact, at all times except when the gun is being cocked—a piston fits into this cylinder, much as a cork fits into the muzzle of a popgun. On the discharge of the cartridge, part of the expanding gases propelling the projectile from the barrel escape through the vent after the projectile has passed that point, and blows the piston from the cylinder exactly as the cork is driven from the muzzle of the popgun. The piston is carried at one end of a lever, pivoted at its other end to the sides of the gun body, so that when the piston is blown from the cylinder, this gas lever swings through an arc of a circle, much as does the lever of an ordinary magazine rifle. In swinging through this arc, the gas lever compresses a spring—really a pair of springs, called "retracting springs"—by which it is returned to its

original position when the force by which the piston is driven from the cylinder is expended. Connected to the gas lever is a link which drives a guide under the barrel proper, toward the breech of the gun. This simple operation actuates the balance of the operating mechanism.

The backward travel of the guide causes an extractor to grasp the head of a cartridge in the feeding belt, withdraw it, and place it on the cartridge carrier. At the same time the ejector withdraws the exploded cartridge from the breech and casts it aside. Further backward travel of the guide causes the cartridge carrier to be tilted and the cartridge to be presented to the breech. Then the hammer of the gun is forced back, compressing the mainspring behind it, thus cocking the gun.

Showing Empty Cartridge Belt being Fed Out of Colt Automatic Gun Mounted on a Standard Tripod: The Operator's Seat, Similar to That of a Bicycle, is Fastened to the Rear Leg, Which Also Carries the Tool Kit

On the forward travel of the guide, that is, once the retracting springs have been compressed sufficiently to overcome the force which drove the piston from the cylinder, the gas lever starts back to its closed position, the cartridge is forced into the breech of the gun, the breech closed and locked, while the feeding wheel is indexed, so as to place the next cartridge in position for the extractors on the next backward travel of the guide. The gun is then loaded and ready for firing, for the hammer which was forced back at the end of the backward travel of the guide is latched in a cocked position by the trigger and the sear. This sear automatically releases the hammer, in automatic operation, just as would a pull on the trigger, but only after the new cartridge has been placed in the breech and the breech locked. The gun thus operates automatically as long as any cartridges remain in the feeding belt. When a steady stream of shots is discharged from the gun, which is accomplished by holding the trigger back without releasing it, the hammer is held by the sear in this cocked position only momentarily. Pulling the trigger of the gun operates the sear and releases the hammer, which is then driven forward forcibly by the mainspring behind it, the hammer striking the firing pin which explodes the cartridge.

Here the Gun is Mounted on a Light Landing Carriage. The Ammunition Chest, Which is Shown Open, Contains Feed Boxes That Have a Capacity of 2,000 Rounds. The Seat is Attached to the Carriage Tongue

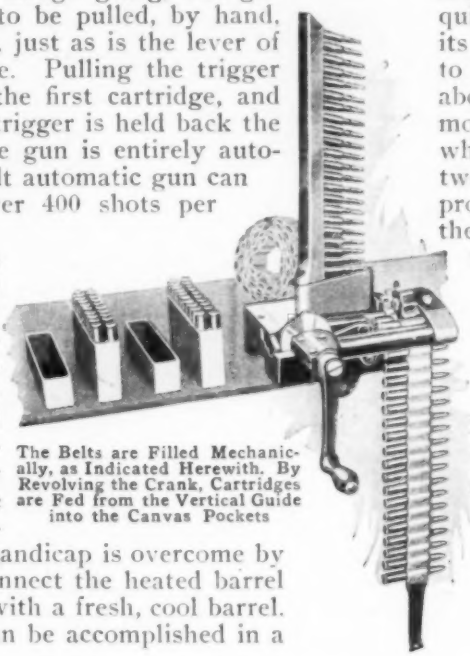
The gun barrel, as will be noted, is quite heavy and its surface is indented with deep serrations, which are of great service in keeping the gun cool, giving to the barrel a large amount of exposed surface. This cooling is assisted by a jet of air automatically forced through the barrel by the reciprocating action of the hammer. On moving backward, the hammer compresses the air that has been trapped in the mainspring pocket, and this is forced through a small tube leading to the chamber of the gun, so that, on the ejection of each spent cartridge and before the insertion of a fresh one, a jet of air blows the barrel clean and free of unburnt bits of powder or of hot gases.

These automatic guns are usually mounted on tripods, in such a way that

they can be pointed in almost any direction. Or they may be mounted on light two-wheeled carriages, on automobiles, or on parapet mountings for fortifications, and in various other ways.

To place the gun in operation, a feed box in which the long belt containing the cartridges are looped in layers is attached to the breech casing of the gun, and the end of the belt is entered between the feed guides. To cock the gun and start things going, the gas lever has first to be pulled, by hand, down and back, just as is the lever of a magazine rifle. Pulling the trigger then explodes the first cartridge, and as long as the trigger is held back the operation of the gun is entirely automatic. The Colt automatic gun can fire slightly over 400 shots per minute.

Any machine gun which is called upon to fire some thousands of cartridges continuously will naturally become pretty hot. In the Colt-gun construction this handicap is overcome by ability to disconnect the heated barrel and replace it with a fresh, cool barrel. This change can be accomplished in a few seconds.



The Belts are Filled Mechanically, as Indicated Herewith. By Revolving the Crank, Cartridges are Fed from the Vertical Guide into the Canvas Pockets

Only one man is required to operate the gun, although two others usually accompany him, one to handle the feed boxes and a third in case of accident to either of the other two. The regular standard two-wheeled light carriage is furnished with an ammunition chest holding several cartridge belts, the individual belts containing 250 cartridges. Each belt is carried in a separate feed box, the belt laid in horizontal layers so that it can be withdrawn by the feeding mechanism of the gun.

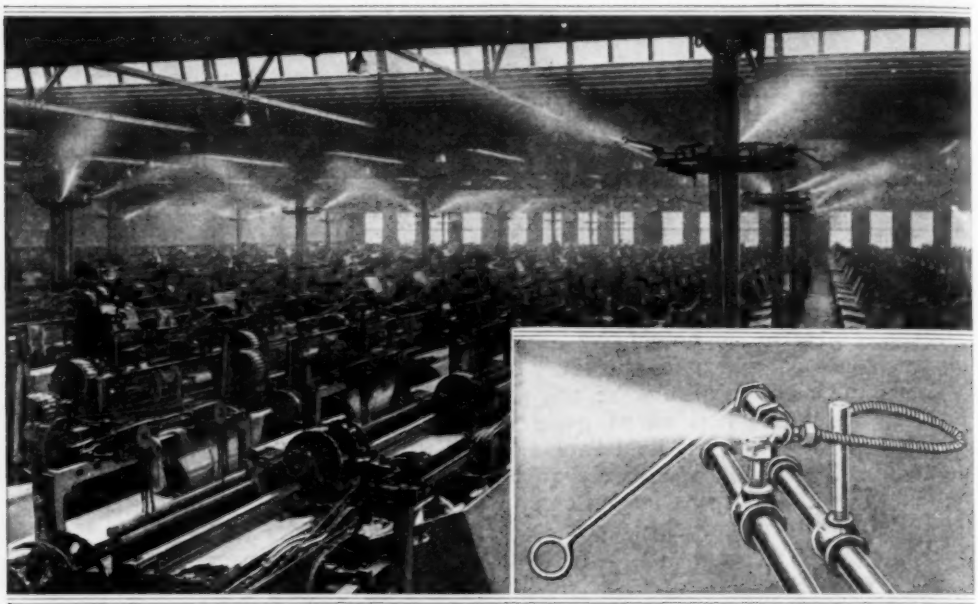
Four feed boxes are included in the equipment accompanying the standard tripod mount, which requires two or three men for its transportation, one man to carry the gun, weighing about 35 pounds, and the mount, weighing 28 pounds, while the others divide between them the tripod proper with its tool bag and the thousand cartridges in four belts, totaling about 125 pounds. Or the complete equipment, consisting of the gun, tripod, tool bag, and four belts of cartridges, in feed boxes, weighing in all, about 180 pounds, can readily be carried by a horse.

The empty belts, conditions permitting, can be gathered up as they drop from the gun, replaced in the feed boxes and subsequently reloaded, either by hand or by an ingenious little belt-loading machine which is operated at a fair rate of speed by a hand crank.

MAKING FOG TO ORDER TO HUMIDIFY AIR

Fogs are in such great demand in certain industries that they must be made to order at great expense. Cotton, wool, silk, and cordage mills, warehouses, paper mills, leather and felt factories, printing plants, and scores of other industrial works require a uniformly humid atmosphere which is not naturally obtainable. One of the most common means of attaining this end is by producing fog at numerous points throughout a plant and mixing it with the surrounding air.

Humidification often eliminates a multitude of difficulties. Consider cotton making, for instance. Cotton, as it is gathered from the fields, contains considerable moisture. In order to make the cotton fibers cling together, and remain strong and elastic, it is



Humidifying the Air in a Textile Factory to Secure the Best Working Conditions for the Raw Material and Fabrics Made: The Insert Shows Details of Spraying Apparatus Seen on Each of the Pillars in the Larger Picture

essential that the natural moisture should be retained. Hence it is necessary to spin, weave, or knit in air sufficiently humid to prevent drying of the fibers. Cotton worked too dry throws off minute fibers in large quantities in the form of dust or lint. This lint quickly accumulates and not only is a considerable loss in itself, but also necessitates constant cleaning of mill and machinery. Furthermore, such dust is highly injurious to the workers and increases the fire hazard.

The fact that the climate of Great Britain is exceptionally moist undoubtedly had much to do with its remarkably early development of textile manufacture. In this country, for similar reasons, textile mills were formerly located almost exclusively on the Atlantic seaboard. Nowadays, climatic conditions make little difference in the choice of a factory site, for rainy-day atmosphere can be obtained the year round, if desired, by artificial humidification. Even in England over half of the cotton mills are today humidified by artificial means.

In the early days of textile manufacturing, floors were sprinkled and troughs of water were kept near the machines—a crude method. Later, steam was employed. This accomplished the desired result, but overheated the air and made working conditions intolerable. Nowadays one of the commonest ways of humidifying in mills is accomplished with the aid of compressed air. In the atomizing apparatus used for this purpose, water flows by gravity through a pipe having a nozzle near its end, but it is not under sufficient pressure to rise to the nozzle of its own accord. Compressed air is conducted through another pipe. By turning a lever compressed air enters the nozzle, and in escaping, forms a partial vacuum which draws the water into the nozzle. Here it mixes with the escaping air and is blown out with considerable force in the form of an exceedingly fine spray—in other words, a dense fog—which quickly mixes with the surrounding air. The compressed air alone controls the operation and water cannot overflow and damage stock in process of manufacture.

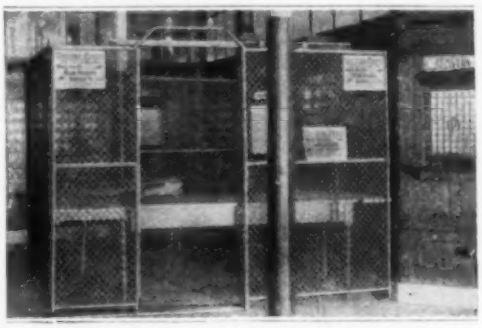
Sometimes hundreds of these atomizing nozzles are located in a single room of an industrial plant.

SPECIAL BODY WILL ANSWER INQUIRIES ABOUT "SAMMIES"

Announcement has been made of the creation of a special division in the army charged with the duty of gathering information regarding the welfare of American soldiers in France for the benefit of families and friends. The branch is known as the Statistical Division and will embrace a personnel of about 1,200 officers, men, and field clerks. Members of the organization will be stationed with the general, divisional, and regimental headquarters as well as with each organization unit at the front. The service will also reach field and base hospitals, ports of embarkation, and training camps in the United States. Because of the small size of our regular army in the past, it has never been necessary to maintain a special body of this character. With a million or more men in the field, however, conditions will be changed. The Navy Department, on the other hand, has arranged to expedite the transmission of so-called "life and death" messages passing between officers and enlisted men and their families. It has been announced that such telegrams should be dispatched to the Bureau of Navigation at Washington so that they may be immediately forwarded by wire or cable to the proper naval station or ship. Communications should be addressed according to the following form: John Jones, U. S. S. Kansas, c.o. Bureau of Navigation, Navy Department, Washington.

CLERKS HANDLE HOLIDAY MAIL IN EXTRA CAGE

Last year congestion of the holiday mails was entirely avoided in the post office at Cañon City, Colo., by partitioning off a suitable space at the rear of the post-office lobby with heavy wire netting and using this reserved area for handling the Christmas packages. The "cage" was provided with a counter, scales, etc., and clerks were stationed at either side of the window to receive, weigh, and stamp the packages. Because of this well-planned arrangement, the office was able to handle 16,500 parcel-post articles and



Special Cage Erected in Canon City, Colorado, Post Office in Which Holiday Packages Were Handled, Thereby Preventing Any Congestion in the Part of the Office Where the Regular Mail was Managed

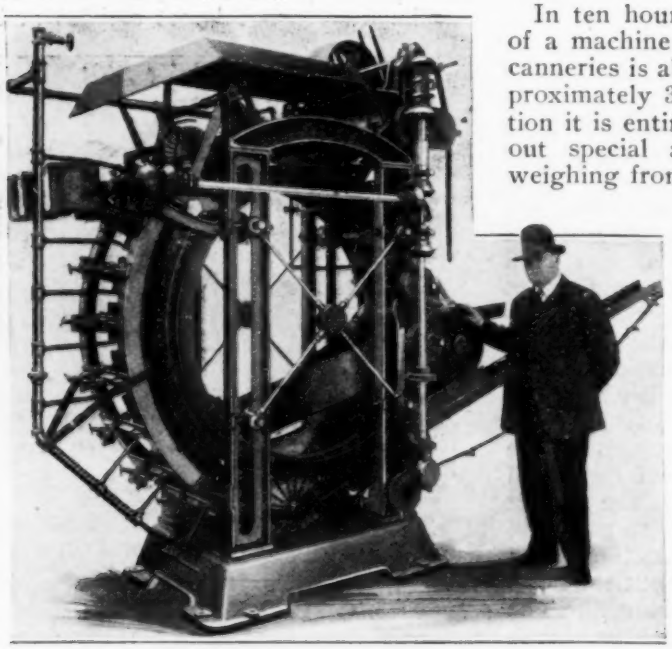
1,624 insured parcels during the week before Christmas—all without interference with the routine postal service.

IRRIGATION SPILL PIPE OF ORNAMENTAL TYPE

In marked contrast to the ordinary spill pipe to be found in irrigated regions, is a very ornamental one inclosed in a paneled concrete column, as shown herewith. The wealthy ranch owner applied artistic taste in the construction of his house and outbuildings and considered it only appropriate that this pipe should be in harmony with its surroundings.

¶By an interesting street-numbering system adopted at Pernambuco, Brazil, a building's number indicates its distance in meters from a central dividing line. A house bearing "235," for instance, would be about 235 meters from the starting point.

SALMON-DRESSING MACHINE WORKS AT HIGH SPEED



Doing the Work of About 60 Experts, This Machine Dresses and Cleans One Salmon Every Second

In ten hours' time the latest model of a machine intended for use in fish canneries is able to clean and dress approximately 36,000 salmon. In operation it is entirely automatic, and without special adjustment handles fish weighing from two to 20 lb. Because of its speed, it is able to do the work of about 60 expert laborers, and thus is an important economic factor in a cannery. As salmon are carried upward and around a large wheel, they come in contact with knives and revolving devices that remove the heads, tails, fins, and entrails. The offal drops to conveyors which carry it to near by fertilizing plants, while the fish proceed to scrubbing troughs.

ARTESIAN WELL BURSTS FROM ITS CASING

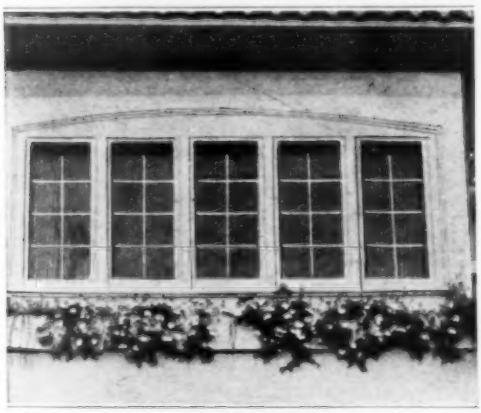
An artesian well that has been a source of trouble to the village of Sheldon, N. D., ever since it was drilled 15 years ago, burst out of its casing recently and threatened great damage to the community. The well was 780 ft. deep and incased by a 4-in. iron pipe, the original pressure of water at the bottom being 80 lb. to the square inch. An overflow outside the casing soon after the well was connected with the waterworks system, flooded several square miles of surrounding farm territory, and the village was still fighting damage suits brought by farmers when the latest outbreak of water occurred. This time the well pipe sank out of sight and a cavity, 80 ft. in diameter, opened up, the water being in violent motion for two days. Soundings showed the crater to be 70 ft. deep at the point where the well

Crater and Deep Lake Formed by the Bursting of an Artesian Well That Threatened to Undermine the Business Part of a North Dakota Village

pipe disappeared, and its size slowly increased as the edges fell into the newly formed lake. The village officials planned to fill it in and cut off the threatening flow of water by dumping in gravel, to be furnished by the local railroad. It was estimated that at least 130 carloads of gravel and sand would be required to stop the dangerous flow.

BUILT-IN FLOWER BOXES FOR APARTMENT HOUSE

A very artistic and convenient feature which has been incorporated in a new apartment house consists of concrete flower boxes which have been built into the walls of the dwelling as an integral part of it. A spray pipe, connected with the water system, extends along the inner edge of the boxes so that the plants can be sprayed

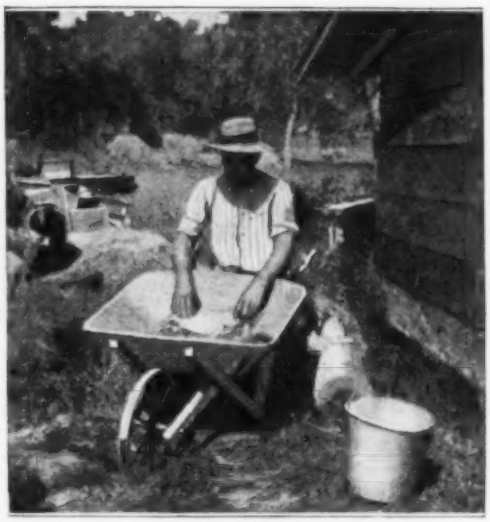


View of End of Apartment House, Showing Flower Boxes Built into the Wall at the Second-Story Level: They are Provided with Permanently Connected Spray Pipes and Drains

merely by turning on the water. Drains are provided which connect with the descending gutter pipes.

WHEN A WHEELBARROW ISN'T A WHEELBARROW AT ALL

To many persons, perhaps, the convenience of a mobile washtub is not entirely apparent. To "Mexican John," who lacks one of a more approved type, however, it gives complete satisfaction. At first thought, the story of a "greaser" washing his shirt in an iron



Possibly an Unusual Glimpse of an Alien Guest: A Mexican Who Washes His Clothes in a Wheelbarrow

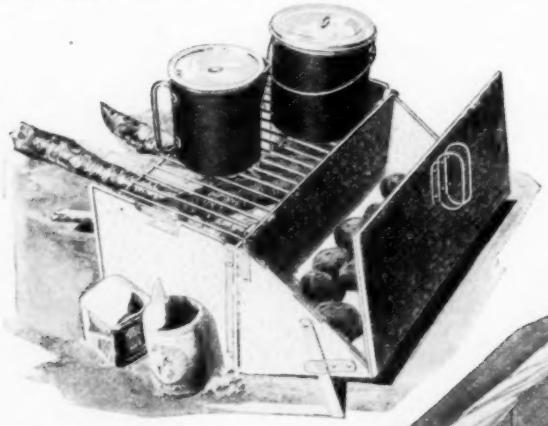
wheelbarrow seems inane, but "Mexican John" gets his shirt clean. That makes it a story!

AUTO FOR ALASKAN TRAILS HAS RUNNERS IN FRONT

The field of the light, well-built American automobile extends even to the snow-clad regions of Alaska. One car owner in the northland has made his machine serviceable on good winter trails by equipping the front wheels with runners and the rear wheels with heavy chains. A special body, which also incloses the engine, is used in place of the regular equipment. This arrangement imparts added warmth to the interior of the car.

Automobile Which Gives Good Service in the Snowy Trails of Alaska: The Rear Wheels Have Heavy Chains

NEW AND SERVICEABLE OUTFITS AND DEVICES

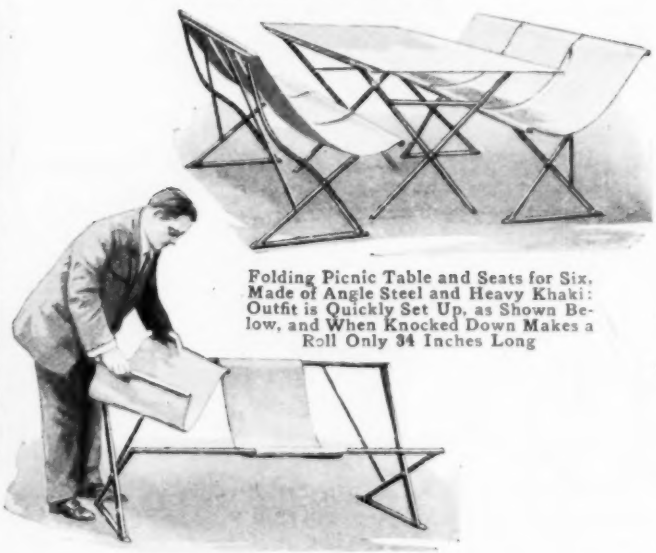


Collapsible Stove and Oven of Galvanized Iron: Wood of Any Length can be Burned by Inserting Sticks Endwise. Folded, It Makes a Flat Thin Package with Smoked Surfaces Within

Broiler and Frying Pan Combined: Grease Runs from Corrugations into the Outer Ring Where It is Not Apt to Burn

Well-Planned Outfit, Including Seven-by-Seven-Foot Tent, Two Double Beds, Two Camp Chairs, and Table: Latter Is of Sheet Metal. Folded, It Measures 11 by 18 by 48 Inches and Serves as a Case for the Whole Eqiupment, as Shown at the Left

By Using Mother's Fruit-Jar Holders the Jars Become Handy Picnic Pails



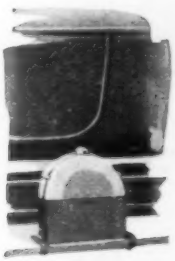
Folding Picnic Table and Seats for Six, Made of Angle Steel and Heavy Khaki: Outfit is Quickly Set Up, as Shown Below, and When Knocked Down Makes a Roll Only 34 Inches Long

THAT ADD TO THE PLEASURE OF OUTDOOR LIVING

The Frame of This Outer's Tent Consists of Three Pairs of Stakes Which also Support a Cot: Outfit can be Rolled into a Package Four Feet Long, as Shown at Left

Leather Refreshment Case with Two Heat-Retaining Bottles and Lunch Box

A Collapsible Grate for an Open Fire: It Is Strong, Quickly Set Up, and can be Packed into a Small Space



Handy Canteen Holder That can be Clamped to Any Auto Running Board without Marring Same

Head Protector of Wire Gauze with Isinglass Window and "Blowhole" That is Handy for the Smoker

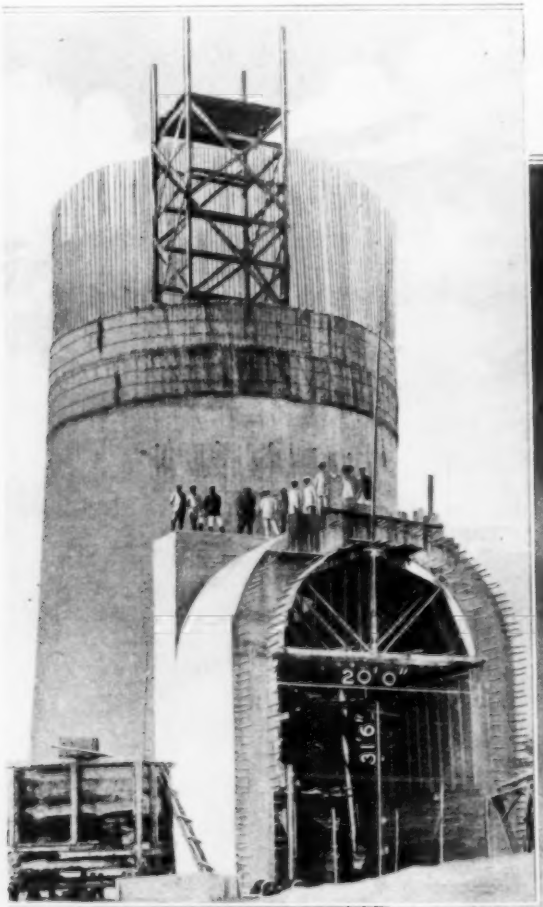
Very Serviceable Table of Wood and Steel for Auto Parties: Collapsed It Measures Four and One-Half by 36 Inches; Weight, 15 Pounds

A Type of Chamois Jacket Made for Men and Women: Light, Soft, Very Warm, and Waterproof; Fine for Outings

WORLD'S TALLEST CHIMNEY COMPLETED IN JAPAN

In many cities in various lands are chimneys which have been proclaimed as "the tallest in the world," but the structure which, without doubt, truly possesses this title has recently been completed in Sagonoseki, Japan. It is of reinforced concrete and stands 570 ft. high, on a hill 430 ft. higher than the copper smelter with which it is connected, so that it discharges its poisonous fumes 1,000 ft. above the plant. The chimney is 42 ft. in diameter at the base and its inside diameter at the top is 26¼ ft. The foundation is 95 ft. in diameter and contains 2,700 cu. yd. of concrete. The first 150 ft. of the chimney has a concrete lining separated from the outer wall by a 5-in. air space. Four hundred tons of steel were used in the whole construction. Only by comparing the photograph of the completed structure with that showing the base alone, which contains an arch 31 ft. high, can one get an adequate idea of the dimensions of this great chimney. A long zigzag flue leads from the smelter up the hill, to the base of the structure.

The reason for making this passageway so irregular was to thoroughly baffle the gases as they passed on their way to the great upright vent.

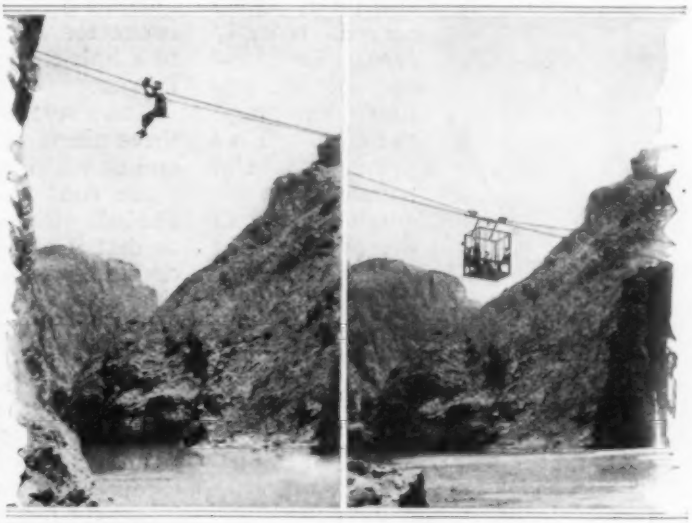


The Base of the World's Greatest Chimney, Showing the 31-Foot Arch to Which a Zigzag Flue was Later Built from the Smelter

If the Woolworth Building Stood on the Ground beside the Smelter This Chimney Serves, the Stack would Tower above the Building About as Shown

CABLEWAY AT BOTTOM OF WORLD'S GREATEST GORGE

The cableway across the Colorado River in the Grand Cañon possesses an interest which perhaps no similar carrier in the world has because of its magnificent surroundings and the extraordinary difficulties encountered in installing it. This aerial way is located a little upstream from the Grand Cañon railway station, which is on the south rim, and is 500 ft. long, the river at this point being 400 ft. wide. The big steel cable was purchased at Salt Lake City and hauled by wagon 225 miles from the end of a railway in Utah to the head of Bright Angel Cañon on the north rim of the great gorge. Here it was divided into seven pairs of coils which were strapped to seven pack horses. The perilous trip down a rough deer trail to the river, though covering only 12 miles, consumed three days. One animal was lost on the way. On reaching the bottom a riverman crossed the turbulent stream trailing behind him a rope with which the cable was later drawn across. Anchored in the steep walls, the steel line supports a cage that is drawn back and forth by a smaller cable and a hand windlass. A toll is charged for use of the cage.

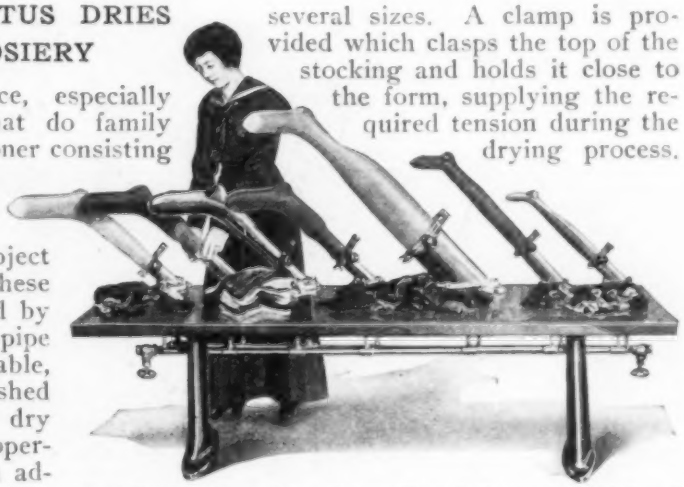


PHOTOS BY D. D. RUST

Left: Crossing Hand over Hand with a Trapeze. When the Cage is Not Available One must Cross This Way or "Go Around," Which Means About a Week's Journey. Right: The Cage Propelled by Means of a Hand Windlass and a Light Cable; It Rides About 60 Feet above Mean Water Level

LAUNDRY APPARATUS DRIES AND IRONS HOSIERY

A labor-saving device, especially suited for laundries that do family washing, is a hosiery ironer consisting of a long, low table, from which hollow stocking-shaped forms of various sizes project diagonally. Over these forms, which are heated by steam supplied from a pipe extending under the table, the damp, freshly washed hose are stretched to dry and to be ironed at one operation. By means of an adjustable heel, each form can be made to fit stockings of several sizes. A clamp is provided which clasps the top of the stocking and holds it close to the form, supplying the required tension during the drying process.



Hose Stretched over These Steam-Heated Forms are Dried and Ironed at One Operation. By Means of an Adjustable Heel, Each Form can be Made to Fit Stockings of Various Sizes

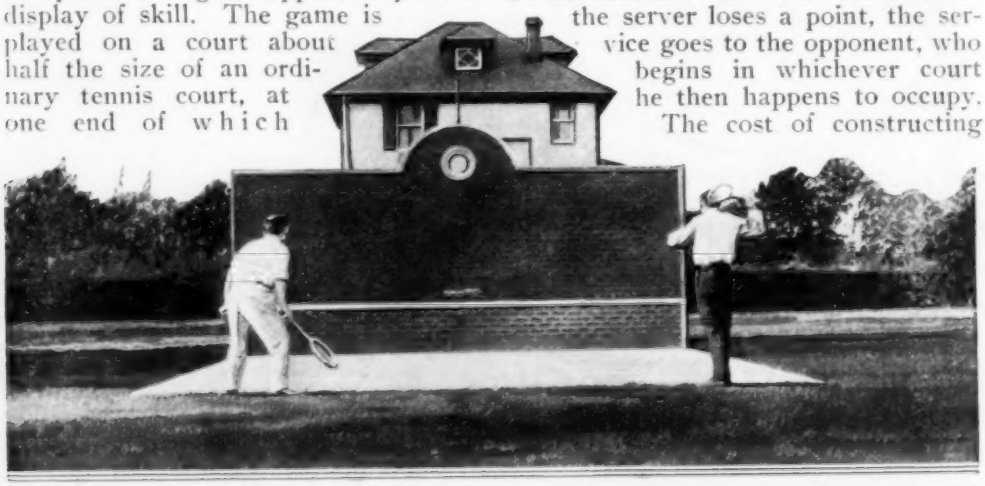
AUTOGRAPHED BASEBALL BRINGS BIG PRICE

A baseball bearing the signature of President Wilson was the novel memento put up at auction at a ball game which was played recently for the benefit of one of the nation's new regiments. The president's signature was secured by one of the congressmen on behalf of constituents who sought to obtain something out of the ordinary for the occasion. The ball was widely advertised and, on being offered to the highest bidder at the opening of the game, was sold for $151. It cost $1.25. The proceeds from the sale of tickets and the ball will be used to purchase delicacies for the regiment.

NEW VARIATION OF TENNIS PLAYED WITHOUT A NET

A modification of lawn tennis, known as "netless" tennis, is attracting the attention of many lovers of mild outdoor sport because it requires less strenuous effort than regular tennis, and yet affords great opportunity for a display of skill. The game is played on a court about half the size of an ordinary tennis court, at one end of which stands a smooth brick wall, extending the full width of the area. The end of the court next to this wall is 3 in. higher than the opposite end. In the center, at the top, the wall has a rounded projection encircling a 10-in. hole, or trap, behind which is a netting connected with a chute that leads down to a hole near the bottom of the brick barrier.

The court is divided lengthwise into three alleys of equal width, the center one of which is called "neutral." The game consists in each player driving the ball with his racket against the wall so that it will rebound into the neutral, or his opponent's, alley. If it strikes the wall below what is called the "fault line," which extends across the barrier 27 in. above the ground, it is considered "out." A ball cannot be played on the second bounce. All points count one except when a ball is driven into the trap and is returned through the hole below, in which case it counts five. The score for a game is 15. Only one service ball is allowed, and when a person is serving he stands facing the left, with his feet parallel to the wall, but after the serve the plays are made in natural positions. The server, or "hand in" as he is called, starts in the right court and alternates after each hand as long as he continues to win. As soon as the server loses a point, the service goes to the opponent, who begins in whichever court he then happens to occupy. The cost of constructing



Playing Tennis without a Net: A Variation of a Popular Game in Which the Players Stand at One End of a Short Court and Seek to Serve, or Return, the Ball so That It will Rebound into the "Neutral" Alley or That of the Opponent

one of these courts depends largely on the taste of the owner. When once built there is practically no upkeep expense. Netting extensions should be placed about the wall to catch wild balls. The floor of the court may be of well-rolled clay or of cement.

MOONSHADE CAMP ACCESSORY FOR OPEN-AIR OUTERS

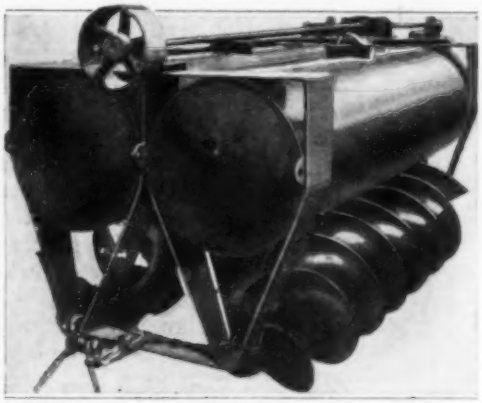
To prevent the moon's mellow rays from disturbing the slumber of mountain campers who taboo tents during pleasant weather, a special shield has been devised. It consists of a rectangular piece of canvas attached to the top of two sticks that are pointed at their lower ends so that they may be driven into the ground readily. By placing the shield at the proper angle and near the head of a cot, one may effectually screen himself from the direct glare of a full moon. The device has been introduced in a district where the absence of dew, and the general

The Shield Screens the Open-Air Sleeper from the Direct Glare of a Full Moon

prevalence of fair weather, make open-air camping the rule rather than the exception among sportsmen and outers.

NOVEL MOTOR UTILIZES WASTE WATER POWER

With a view to utilizing the wasted water power of a stream without building a dam, an interesting experiment has been conducted with an unusual type of water motor which, it is claimed, has operated satisfactorily. The mechanism consists of two floats, 40 in. long, beneath which are two spiral screws, 10 in. in diameter and 32 in. long. Anchored in a stream flowing 2 7/10 miles per hour, it is asserted that the motor

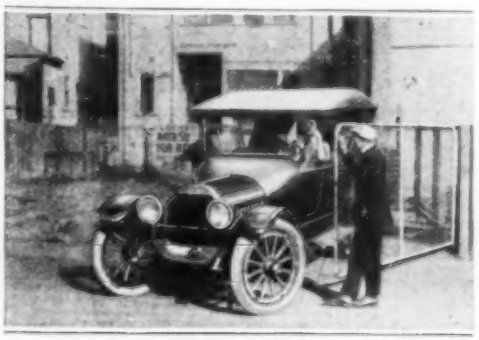


By Means of the Two Spiral Members, Which Are 10 Inches in Diameter, This Water Motor was Able to Develop More Than One-Fourth of One Horsepower in a Stream Having a Moderate Current

developed a little more than 1/4 hp. The possibilities of motors of this sort for practical service are yet to be determined, but the inventor estimates that two motors, 40 ft. long, could produce over 100 horsepower.

BACK YARDS TRANSFORMED INTO AUTO STALLS

Because a western city has been unable to provide adequate parking space for the increasing number of automobiles, residents are fencing off their back yards into auto stalls and are renting them at stated rates. One yard contains four such divisions, each surrounded with a strong wire fence and provided with a gate that locks with a padlock.



Back Yard, a Portion of Which has been Fenced off into Automobile Stalls: Each Division Has a Separate Gate and is Locked with a Padlock

HEIGHT-MEASURING DEVICE IS CONCESSION MACHINE

Apparently on the assumption that a person's height is a matter of almost as much interest to him as his weight, an inventor has recently patented a measuring machine that is intended to take a place beside the gum dispensers, and numerous other vending devices, so familiar in public places. By dropping a coin in a slot and pulling down a flexible contrivance until it comes in contact with the top of the head, one's height, in terms of feet and inches, is registered on a dial on the front of the apparatus. In general design it has much the appearance of the familiar coin-collecting weighing machine.

SEPARATORS SAVE OIL IN BIG AUTO PLANT

In a large automobile manufacturing plant which uses 1,300 gal. of cutting oil per day for drills and other cutting tools, 12 oil separators are employed which effect a saving of 500 gal. daily. Each machine is provided with an outer cylindrical case, within which is a smaller perforated cylinder which revolves swiftly. Into this whirling container workmen shovel metal chips and oil collected from various machines. Centrifugal force thrusts this greasy mass against the sides of the container and the oil gradually works its way through the holes, while the metal remains within. The oil so conserved is used again and again representing an important saving to the company.

CONCRETE CONE OBVIATES RESETTING OF STAFF

By constructing a large cone of concrete about the base of a 120-ft. flagstaff, a resourceful city engineer obviated the necessity of resetting the staff, which had become so loose that it threatened to fall. The cost of reënforcing the base was about half the estimated cost of resetting. Several braces were firmly spiked to the pole near its base, and then earth was excavated around it to a depth of 10 ft. At the bottom of this hole, 12-ft. piles were driven, 6 ft. apart. A cone of concrete which projected several inches above ground level, was then poured over the top of the piles and earth filled in about it. The new base made the staff absolutely secure.

QUEER PHOTO SHOWS PUFFS PRECEDING BIG BLAST

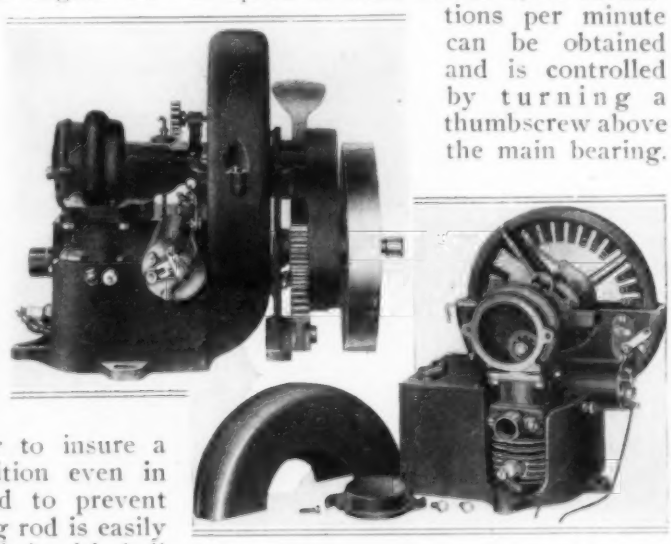
A strange-looking photograph, which at first glance might be mistaken for a picture of trees of some strange species, was taken recently just as a big blasting charge was set off in a lime quarry. Eight tons of powder were placed in fifty-four 8-in. holes that penetrated the earth to a depth of 50 ft. The picture is very unusual in that it shows smoke shooting from

The Beginning of a Tremendous Blast: This View was Snapped Just After Eight Tons of Blasting Powder was Set off. The Vertical Puffs of Smoke Preceded the Upheaval by Only an Instant

the holes in tall, straight puffs immediately before any earth was dislodged. Evidence of the upheaval that was to follow is found also in the little clouds of smoke issuing from the sides of the embankment.

LITTLE ENGINE FOR HOME HAS ORIGINAL DESIGN

Both in appearance and in other features a little portable engine for home and farm use, now on the market, is unusual. As a safety precaution, all its moving parts are inclosed, except the pulley, on which a belt can be placed to run practically any machine that can be operated by a hand crank. The flywheel is in reality a large fan which forces a blast of air down around the cylinder to keep it cool. The latter is inverted in order to insure a favorable starting condition even in the coldest weather and to prevent flooding. The connecting rod is easily adjustable and is provided with ball bearings. The engine has no oil cups, lubrication being obtained by mixing oil with the gasoline. One feature which makes it easy for inexperienced persons to operate this engine is a combination foot starter and countershaft. A speed of from 500 to 1,400 revolutions per minute can be obtained and is controlled by turning a thumbscrew above the main bearing.



View of Portable Engine for Home Use Easily Operated by an Inexperienced Person. Lower View: Engine with Crank-Case and Flywheel Covers Removed, Showing Fan Flywheel and Cylinder

REVOLVING BRUSH CLEANS THREADS IN SHELLS

At a certain plant now engaged in the manufacture of war munitions, an efficient scheme has been devised for cleaning the threads in the nose of a shell. A wire brush attached to the tool end of a portable electric drill is employed. The shells lie horizontally

COURTESY OF MACHINERY

Cleaning the Threads of Shells with the Aid of the Motor-Driven Wire Brush

in racks so that the brush may be readily introduced into the orifice. In this way only a moment is consumed in freeing the threads of small chips and dust particles.

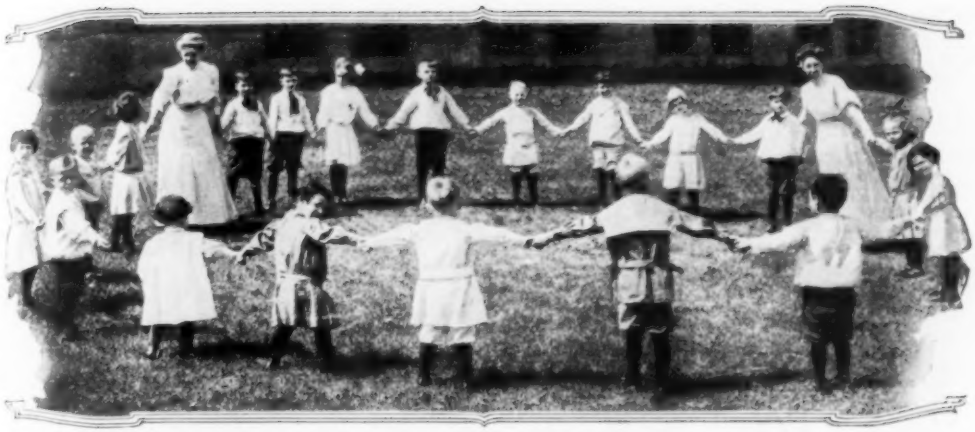
WAR DEPARTMENT'S VIEWS REGARDING USE OF FLAG

Many inquiries have been received by the War Department concerning the proper methods of displaying and hanging the national emblem. In response, the adjutant general has issued a statement in which several suggestions are made to civilians. In doing this, attention has been called to the fact that there is no federal law regulating such matters and that the War Department exercises no authority outside of the army.

Each day of the year, regardless of weather conditions, it is the custom in the army to hoist the flag briskly at sunrise and to lower it slowly and ceremoniously at sunset. On Memorial Day it is displayed at half-mast from sunrise until noon, and at full-mast from noon until sunset. In general, the flag should be suspended from a staff in the formal way, and not displayed otherwise. For decorative purposes bunting, not the flag, should be employed. If, however, the emblem is to be used in that way, it should always be hung flat with the union toward the north or east, regardless of whether the display is made inside or outside of a building. A flag should rarely be placed in a horizontal position or laid flat, and under no circumstance should it be hung where it would easily become soiled or injured. It should never be draped over chairs or benches that are to be used for seating purposes, and in no case should anything be placed upon or above it. The War Department sees no objection in flying the flag at nighttime on civilian property. When several banners are unfurled on the same pole, or otherwise displayed, the Stars and Stripes should be run up first and given the position of honor above all others.

When a flag becomes old or worn it should not be used. If it is no longer fit for display, it should be privately destroyed. This should be done by burning it in a manner free from all suggestion of irreverence or disrespect.

Several states and, undoubtedly, many municipalities have enacted laws bearing upon the question of how the flag should be used and treated. In the main, however, it is only necessary that civilians show due respect. If strict military ethics are observed, the flag will not be draped for decorative purposes. But if it should be used in such a manner, care must be taken that it is not cut or otherwise mutilated.



Deaf School Children at Play: The Manner of These Well-Trained Little Folks on the School Ground Is Quite Like That of Normal Boys and Girls

TEACHING THE DEAF TO HEAR WITH THEIR EYES

By ROBERT H. MOULTON

AMONG the twelve hundred pupils of the Parker School, one of Chicago's largest public schools, there are more than a hundred children, ranging in age from five to fifteen years, who have never heard the sound of a human voice. Yet to distinguish these children from their more fortunate fellows because of any imperfection in their speech or their inability to understand the speech of others, would be a difficult task. Although born deaf, they have been taught to speak almost as well as hearing children, while their skill in reading the lips of a speaker is little short of miraculous.

Learning to Make Sounds Properly: In the Instruction of Deaf Children Much Depends on Properly Illustrating How to Place the Tongue with Relation to the Teeth

If you should go to the Parker School any fine morning you would probably see on the broad lawn in front of the school various groups of children at play under the watchful eyes of their teachers. But it is not likely that your attention would be attracted to any particular group because of anything unusual in the children's manner of addressing their teacher or one another; all are romping, laughing, and shouting merrily. Yet the chances are that some of these children are among the hundred who have never known the blessed privilege of hearing.

Entering the school, you might go from room to room, and not discover for quite a while anything peculiar in the manner of instructing certain of the classes. But in some of them you will find the same little tots, who cannot hear, that you passed on the lawn. If their eyes happen to be turned away from the visitor upon his entrance, their attention is not attracted, since their organs of sight have to perform the duty of the useless ears. Should they see the newcomer, however, they will smile a welcome,

then direct their gaze once more to the lips of their teacher. It is this concentration of gaze which first betrays their physical handicap. All the knowledge they receive must come through the sense of sight, and so their eyes

Learning to Say "Dog": Note How Intently the Pupils are Watching the Teacher

are ever on the alert to catch the smallest movement of their teacher's lips. When they speak a little later in answer to some question, the voices of the very young children may sound a little peculiar to one who is not accustomed to talking with the orally taught deaf, but this peculiarity vanishes as their education advances.

Teaching and Illustrating the Word "Smell": Objects are Used Very Effectively in Conveying Many Different Ideas, Especially to Younger Pupils

The teacher always talks busily and naturally to the children, just as if they could hear, no form of communication other than spoken language being employed. This is necessary in order to so develop the mentality of the children that they shall think and express themselves in spoken language as naturally and unconsciously as hearing children. If they were allowed to depend on gestures or written forms to any extent they would not so readily acquire the fixed habits of watching the lips and of concentrating attention that are necessary to catch the meaning of the spoken form.

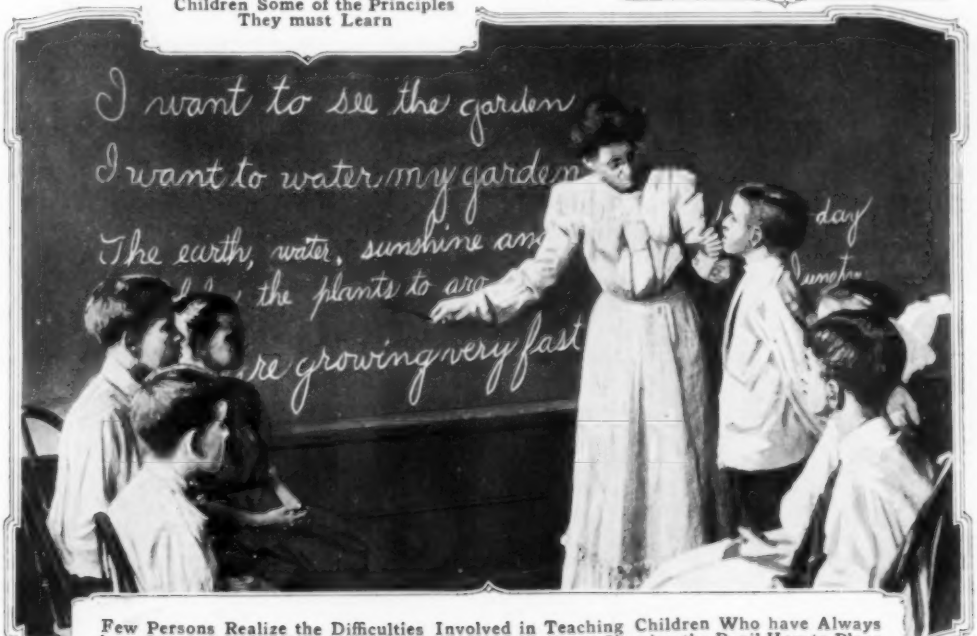
Only the simplest words are given to the child to reproduce at first. These are really not words at all, but mere sounds. When individual sounds have been mastered, they are combined to form words. For example, suppose the child has learned to make the sounds of the vowel "a" (ah) and the consonant "m." The teacher now places the child's hand upon her throat, and the child, all eagerness, prepares to imitate her. First she begins with the sound of "a" and, while still uttering it, gently closes her lips. This action causes the sound of "m" to follow "a," and the result is the word "arm." When the little scholar is made to understand to what the word applies he is usually so delighted that he needs no urging to repeat it over and over until he has it just right.

Sometimes the positions may be excellent, but the sounding weak. The teacher will then direct the child to use his voice. The meaning of this direction and the way of obeying it are taught in the very beginning of the work by holding the child's hand upon the teacher's throat and chest while making utterance of a sound. His

Combining Instruction with Play: Because of the Children's Infirmity Those Who are Instructing Them Necessarily Come into Intimate and Personal Contact with Each One. It will be Noted That the Pupils' Faces are Turned toward the Teacher so That He or She can Watch the Movement of Her Lips

A Daily Lesson in "Feeling" the Sound of a Piano: Vibrations Felt in a Musical Instrument Help to Teach the Unfortunate Children Some of the Principles They must Learn

The Hands are Much Used in Teaching Proper Speech to the Deaf: Here the Child is Learning to Make the Sound of "e" in the Word "Me"



Few Persons Realize the Difficulties Involved in Teaching Children Who have Always been Deaf to Make Certain Sounds. Much Depends on Showing the Pupil How to Place the Lips, Tongue, and Teeth. In the Picture Above, the Teacher has Found That the Boy on Coming to the Word "Plants" Has Difficulty with the "ts," and is Endeavoring to Show Him How the Proper Sound is Made

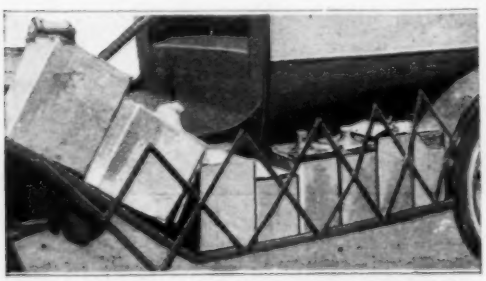
hand is then applied to his own throat and chest until he has produced similar vibrations. All the while, of course, he is watching his teacher's lips, and the direction is repeated until he has learned its meaning.

The power to distinguish differences of vibration by touch is a very important thing, for it is the child's chief guide in modifying his own voice later —in raising it if it is too deep, or lowering it if it is too shrill. Exercises bearing upon this are conducted with musical instruments such as the guitar and piano, and then applied to the vibrations as felt in the chest, head, and throat. The teacher first strikes a low note, and the child, watching, feels the vibration. Then she strikes a high note and calls his attention to the difference. Next, she places his hand upon her throat while she sings low and high notes alternately, and in time he acquires the ability to recognize the difference in tone by touch.

The making of aspirate sounds, requiring the forcible exhalation of breath, such as "p," is explained by using a feather or lighted candle. The expulsion of breath blows the feather away or causes the flame of the candle to flicker.

Speech-reading, which is the ability to understand spoken language by watching the speech movements on the speaker's face, goes side by side with the teaching of speech. From the first hour the child is taught to watch his teacher's lips and to attach a meaning to all their movements, and he learns to interpret spoken language with his eyes as the hearing child does with his ears without knowing the how or why of it. The older pupils at the Parker School are all extremely proficient in reading speech. They easily receive communications from their teachers across a large room, and some of them can take words quite as readily from the profile as from the face when turned directly toward them. One girl showed her ability in this direction by reading the lips of a speaker from the shadow cast on a wall.

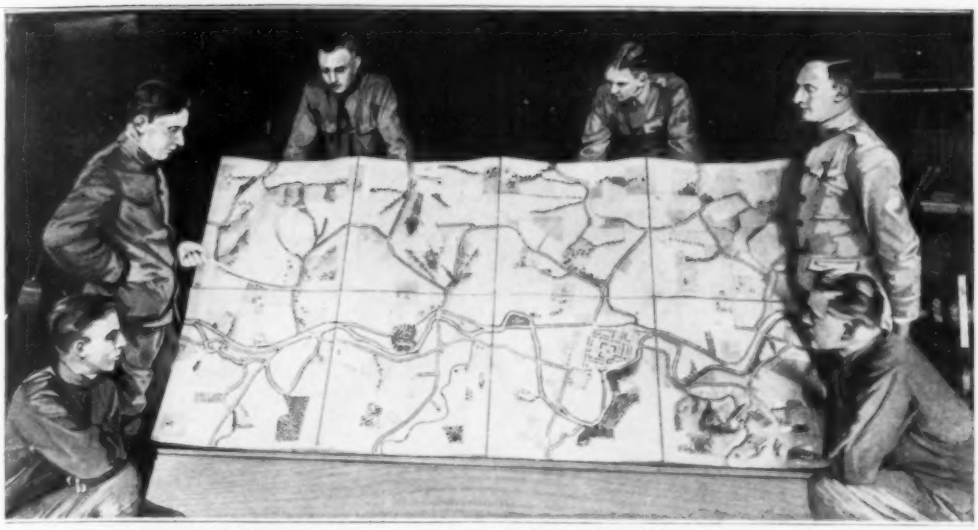
The teaching of speech to deaf children puts them on a more equal footing with hearing children both in their social and business life. Very few hearing people will take the trouble to learn the sign language, or finger spelling, just for the purpose of conversing with one or two persons, and a system of written communication is always slow and laborious. For this reason the deaf child who cannot speak is always at a great disadvantage when attempting to mingle with his more fortunate brothers. But with speech at his command he finds open to him a thousand avenues of happiness and usefulness of which he formerly knew nothing. To one who watches, the work of transformation that takes place in a little deaf child after a few months of teaching by the oral method is simply amazing. The change from nervous and moody discontent, such as characterizes many of them in the beginning, into a state of radiant happiness and peace of mind, is like beholding the evolution of winter into spring.



Lazy-Tong Type of Holder for a Running Board: It is Light and Durable and can be Folded Back against the Rear Fender When Not in Use

FOLDING HOLDER ATTACHES TO SIDE OF AUTO

The running board of an automobile can be safely loaded from end to end by equipping it with a holder of lazy-tong type, which can be stretched from the front to the rear fender. Advantages of such a carrier are that it is light and durable and when not in use may be folded back against the rear fender to which it is attached.



Solving War Problems: Soldiers Studying an Ingeniously Designed Relief Map Composed of Eight Sections Which can be Interchanged to Make More Than 2,000 Different Combinations

MILITARY RELIEF MAP HAS INTERCHANGEABLE PARTS

A single relief map which is composed of interchangeable sections, so designed that they can be put together in more than 2,000 different combinations, is now being employed in schools and by many military groups in the study of tactics, map reading, intrenching, and topographic sketching. Each section varies from ¾ to 2⅝ in. in thickness and is 2 ft. square. The eight sections represent eight square miles and are finished in five colors, indicating a variety of natural conditions. Practically any type of terrain the instructor may desire can be obtained with these parts. The sections are interchangeable because certain of them have similar profiles, thus permitting them to be fitted together in the great variety of ways stated. The map comes packed in a cabinet measuring 25 by 25 by 28 inches.

PHOTOS SHOW HARDSHIPS OF MINING

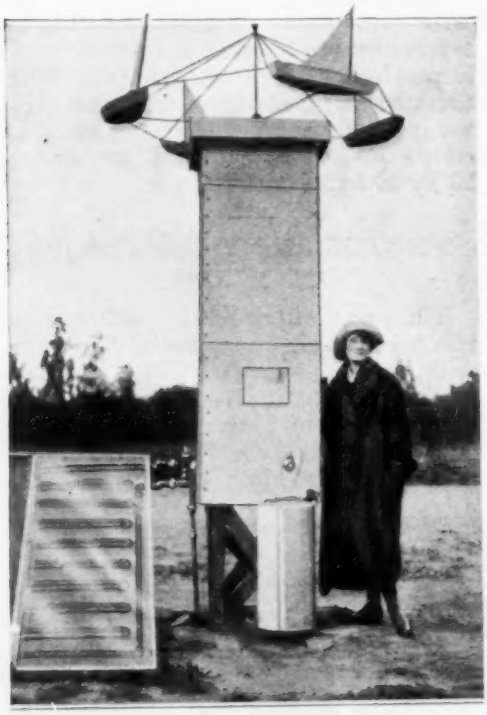
The two flash-light photographs taken in mines, which are shown herewith, while possessing little that appears at first glance to be unusual, are nevertheless of interest in that they indicate certain difficulties under which mining is sometimes conducted. To

Left: At the Right Side of This View, Taken in a Mining Shaft, Is a Mass of Ice Incasing a Ladder, an Eight-Inch Water Pipe, a Six-Inch Compressed-Air Pipe, and Four Electric Wire Conduits. Right: The Mouth of This Shaft Is Only 16 Feet above Sea Level, and the Men Are 3,000 Feet below the Mouth

the right of the lone miner shown in one picture is a large formation of ice produced by the downward draft of air in the shaft. Included among the objects incased in this ice are a ladder, an 8-in. water pipe, a 6-in. compressed-air pipe, and four electric-wire conduits. The other view was taken on the 3,000-ft. level of a coal mine, and as the altitude at the mouth of this shaft is only 16 ft., these men are working nearly three-fifths of a mile below sea level.

SMALL SAILBOATS FORM ARMS OF A WINDMILL

An odd form of windmill is used for the double purpose of operating a pump and attracting attention to a solar heater in which the pump circulates



Sailboat Windmill Which Drives the Pump of the Solar Water Heater Seen below It

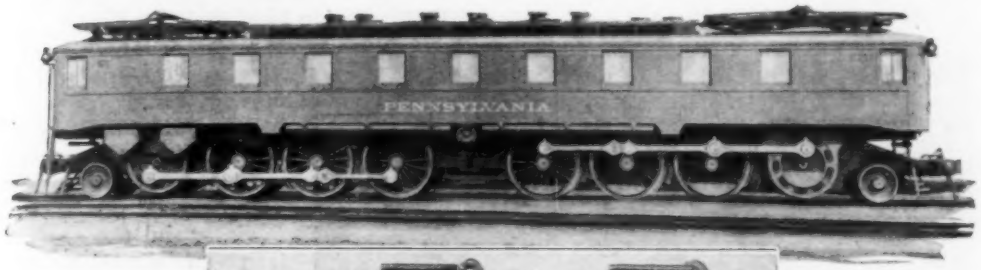
water. The mill is formed of four small sailboats of different colors, mounted on arms which turn on a central shaft and so operate the pump when the wind blows.

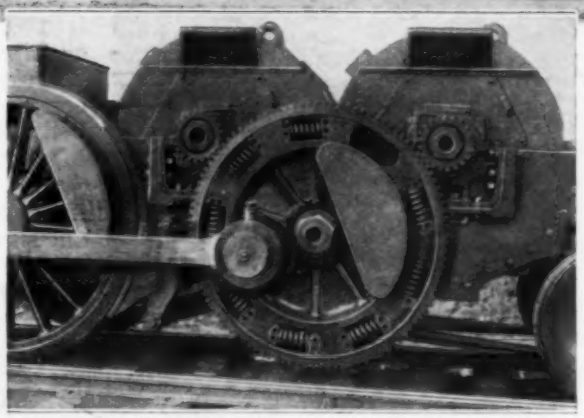
ARTISTS TAKE VITAL PART IN WAR'S ACTIVITIES

European painters and sculptors are playing a most fascinating rôle in the world conflict. Through their efforts the art of "camouflage," as the French call it, has been developed to such a remarkable degree that it now takes a highly important part in military operations. The word is derived from the verb "camoufler," and, as an idiom, means to make up, disguise, or render unrecognizable. Many of France's younger artists belong to the "Bataillon de le Camoufle," and are literally the scene painters who fashion the sham stage settings and properties for the theater of war. To them falls the task of making ammunition depots look like hillocks or even open fields; of giving a howitzer or mortar the appearance of a tree or stump; of concealing from the view of enemy airmen an important road over which troops and munitions are to be moved; of making broken trees and dilapidated carts look like big guns so that the enemy artillery will waste its effort; and of executing hundreds of other deceptions of similar character. Motor trucks are painted with splotches of blues and purples, chromes and greens, to render them inconspicuous.

The work of these fellows is not without its dangers. Often it is necessary for them to ascend in aeroplanes and study from aloft the effect of their efforts. At other times they have to advance ahead of the first line under cover of darkness and take measurements that will enable them to make a copy of some tree trunk or crumbled wall in "No Man's Land," armor it and have it quickly substituted before dawn to serve as a bullet-proof shelter for observers. All of the nations at war are practicing camouflage, but so far the French seem to have the lead. It is interesting, in view of the part we are now assuming in the hostilities, that an academy of camouflage was conducted during the summer months at a military preparatory camp established by an eastern university.

POWERFUL ELECTRIC ENGINE IS BUILT IN EAST





Big Electric Locomotive Constructed in Anticipation of the Electrification of a Railway Line in the Allegheny Mountains and a Close View of One of the Trucks, Showing the Character of the Spring-Gear Wheels through Which Dual Motors Transmit Their Power to the Drivers

In size and power an electric "Mother Hubbard" that has been constructed by the Pennsylvania Railroad Company commands attention. It is said to be the largest locomotive of its type so far constructed in America, but irrespective of the correctness of the claim, the engine has an over-all length of 76½ ft. and, at a speed of 20.6 miles an hour exerts a tractive effort of 87,200 lb. It weighs 240 tons and is mounted on two trucks, each of which has dual motors connected to a jackshaft that operates the drivers through a pair of spring-gear wheels. The latter are joined to the driving wheels by side rods, while the remainder of the driving and running gears are similar to those used for steam locomotives. The engine uses an 11,000 - volt, single - phase current which is taken from an overhead trolley. Each of the four motors develops 1,200 hp. Electric machinery is attached to a platform floor, or upper deck, which extends over the central part of the cab for a distance of about 37 ft. The roof above this section is removable, and turtle decks at either end of the locomotive have large hatches, to permit the removal and replacement of the electric apparatus.

UNIVERSITY CULTIVATES DRUG HERBS

By R. P. CRAWFORD

THE College of Pharmacy of the University of Nebraska now secures its supply of crude drugs from its own garden. While the project was started in a very small way a few years ago, it has now been extended until 110 different drug-producing plants are grown. The actual conditions under which such plants can be successfully propagated are being studied, since with the imports of crude drugs cut off, a great deal of importance attaches to the discovery of means by which the industry can be successfully carried on in this country. What is believed to be the first course of its kind to be offered in a university has been established this year, consisting in the study of the raising, curing, and preserving of crude drugs.

While there are commercial drug gardens in which some varieties of plants are raised, there are few gardens, indeed, in which practically every plant producing a well-known drug is represented. As many as 13 varieties of a single plant, digitalis, have been grown, and when it is recalled that there are 110 different kinds of plants in the garden, the magnitude of the undertaking is apparent. Practically every corner of the country was combed in the search for seeds and plants from which certain drug plantations could be started. Even an obscure little nursery in India was sought out in the effort to get hold of some tropical products. The fact that the drug-plant industry is in its infancy in this country made the securing of certain seeds and plants extremely difficult.

The Drug Garden has been Planned so Skillfully That a Casual Observer would Doubtless Imagine It a Part of the Landscaping of the University Campus

The University of Nebraska is endeavoring to develop plants that are efficient and adapted to a temperate climate. While in the past, drugs have often been secured from the leaves of plants which grow wild, the large drug houses are now demanding a high quality of product. The average person would think that all plants of a certain variety would be the same as regards drug content. The University of Nebraska, however, is seeking to increase the amount of actual drug to each pound of the crude product. This factor may lie in the quality of seed, the time of harvesting, the kind of soil, method of curing, and perhaps four or five other factors. The stupendous character of the study of scores of plants, especially in their relation to a temperate climate, may easily be perceived. There are certain plants such as belladonna and stramonium which, for instance, require lime in the soil, since they produce medicinal alkaloids. Among the plants which it has been determined may be raised with good hope of success by the ordinary gardener in the Middle West are the mints, peppermint and spearmint, digitalis, henbane, purgative rhubarb, hydrastis, lavender, and Indian hemp. It should be noted that some plants are quite poisonous and the amateur engaging in the drug-plant business should take care that domestic animals do not accidentally feed on the leaves.

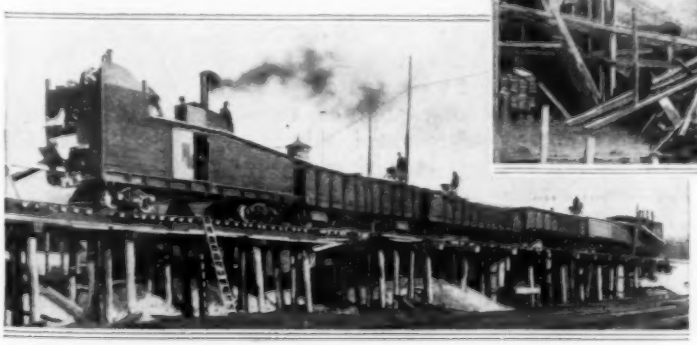
One Hundred and Ten Different Drug Herbs are Grown by the College of Pharmacy at the University of Nebraska. Above, Some of the Plants are being Dried

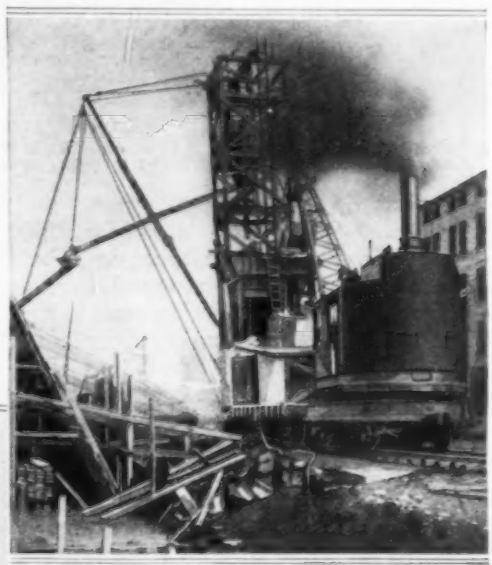
Aside from being a novel project of its kind, the Nebraska garden has been made still more out of the ordinary by its arrangement as a part of the university campus design. There was no space available for a garden of merely a utilitarian sort and it was concluded to make it decorative as well. One of the rectangles on the campus was set

aside for the project and here the drug plants have been grouped in a symmetrical design. The trees and shrubs have been placed on one side, while the smaller plants are set in little plots, each surrounded by grass. In the center is a pool, around which the water plants are arranged. The whole is enclosed by a privet hedge. So skillfully was the work done that the casual observer would take the garden to be only a decorative feature of the grounds.

CONCRETE-MIXING OUTFIT HAS TRAVELING TOWER

A concrete-mixing outfit for railroad-construction work, in which a number of money-saving features have been embodied, has as its principal unit a flat car on which is mounted an ordinary mixer. The car is strongly trussed and when the nature of the work requires it, an 8 by 8-ft. tower is mounted on one end for use in pouring the concrete. In such a case the mixer engine is used to hoist the material to the top of the tower. Since the latter requires no guys to steady it, it can be moved back and forth as desired, thus making possible a great saving of time and labor. When only a single track is available for the construction crew, a train of gondola cars loaded with cement and gravel is attached to the mixer, and the workmen wheel the material along planks, laid on top of the train, to the hopper. When two tracks are available, a self-propelling crane may be used to transfer material to the mixer's hopper from cars drawn alongside.





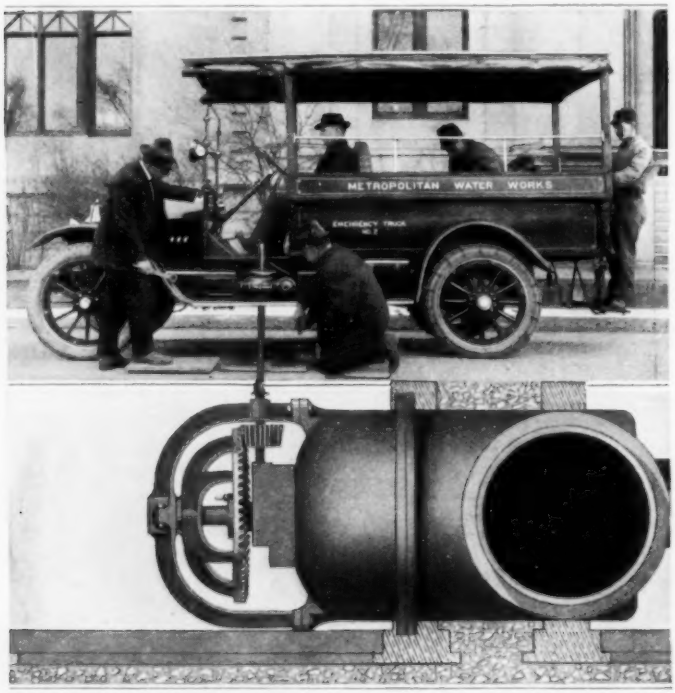
Above Is a View of a Portable Concrete-Mixing Outfit, Including a Tower, Mounted on a Car. At the Near End of the Material-and-Construction Train in the Left-Hand Picture, the Mixer Car is Shown with Tower Removed

FLEXIBLE GEAR EQUALIZES POWER OF CYCLE ENGINE

To equalize the varying power of twin-cylinder motorcycle engines and thus relieve the machine and rider from vibrations, a spring sprocket has been developed. It is said to eliminate the jars due to power transmission without lessening the efficiency of the motor. Six heavy coil springs, incorporated in the gear, receive excess power and deliver it to the rear wheel between strokes when the pull of the engine is at its lowest ebb. At a cost of considerable energy, vibration has formerly been combated by allowing slipping in belts, clutches, and compensating sprockets. With the new appliance, the surplus power is conserved and utilized instead of being lost.

TRUCK APPLIANCE OPERATES WATER-MAIN VALVES

To facilitate the work of opening and closing the valves of water mains, a device, mounted on one of the running boards of a motor truck and operated by the latter's engine, has been developed. In use, a car equipped with the appliance is stopped over a manhole in such a position that a rod may be placed vertically to connect the valve stem with the apparatus. The driver shifts the gears to low speed and allows the engine to run until a safety mark, indicating that the valve has been opened or closed, as the case may be, appears on the valve stem.



Showing the Device in Operation Opening a Water-Main Valve. It Saves Much of the Time and All the Labor Required by the Manual Method

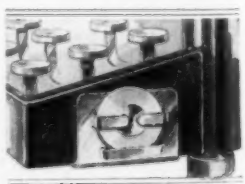
¶The War Department has ordered a map prepared showing the electric railway lines of the country, the idea being, where possible, to relieve steam roads of excessive strain at points connecting with military camps, etc. Trolley lines can render a big service in this way.

SMALL MEN GIVEN CHANCE BY NEW ARMY RULING

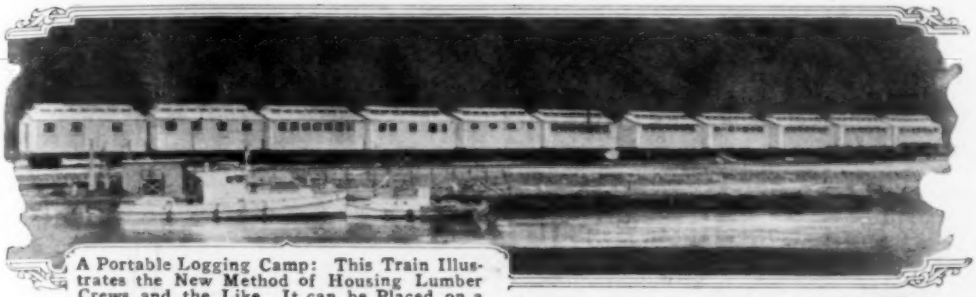
American boys of small stature and good physical condition have been given an opportunity to do their "bit" in France. Orders recently issued by the War Department to army recruiting stations change the minimum height and weight ruling from 5 ft. 4 in. and 120 lb., to 5 ft. 1 in. and 110 lb. It is understood that the revision was made upon the recommendation of Surgeon-General Gorgas who contended that many capable fighters were being needlessly kept out of military service. The new order recalls an incident that occurred some time ago when a nationally known bantam-weight pugilist endeavored to enlist. Although in perfect physical shape and respected by men twice his size, he was refused admission to the army because of his height—or rather, the lack of it.

TYPEWRITER ERASER HOLDER NEW OFFICE ACCESSORY

Convenient for stenographers and others is an eraser holder which may be attached to the frame of a typewriter at one side of the keyboard where it is within easy reach. The appliance is a small metal pocket that will hold an eraser of almost any of the standard sizes used in offices. Its use obviates a source of much confusion.

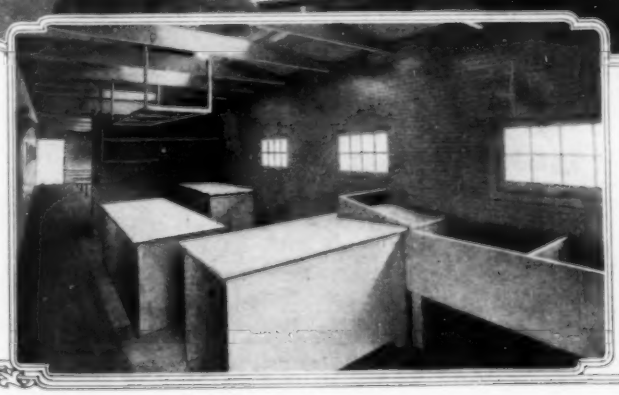


TRAIN EQUIPPED AS A PORTABLE LUMBER CAMP



A Portable Logging Camp: This Train Illustrates the New Method of Housing Lumber Crews and the Like. It can be Placed on a Sidetrack within Easy Access of the Timber to be Cut and can be Moved Any Distance Desired on Very Short Notice and with Little Inconvenience to the Men. Old Flat Cars are Often Used in Making These Outfits

Above: Workmen's Sleeping Car with a Capacity for 28 Persons. The Bunks are Arranged in Two Tiers Like Regular Berths and Each is Provided with a Separate Window. A Diner is Shown at the Left

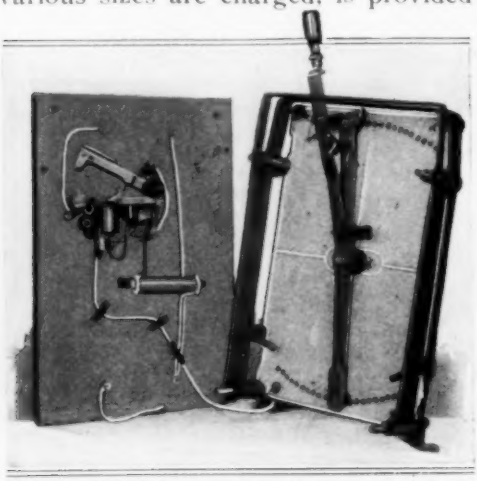


The Picture Above Is of the Interior of a Dining Car Which Seats 72 Men. Stools are Provided Instead of Benches. Overhead Ventilators Let in Additional Light and Air

Left: A Combination Kitchen and Dining-Car Designed Especially for Use by Crews of 20 to 40 Men. View Shows Typical Kitchen Equipment and Gives a Glimpse of Dining-Room

FOOLPROOF RHEOSTAT FOR GARAGES

A new universal rheostat, designed for use in garages where batteries of various sizes are charged, is provided

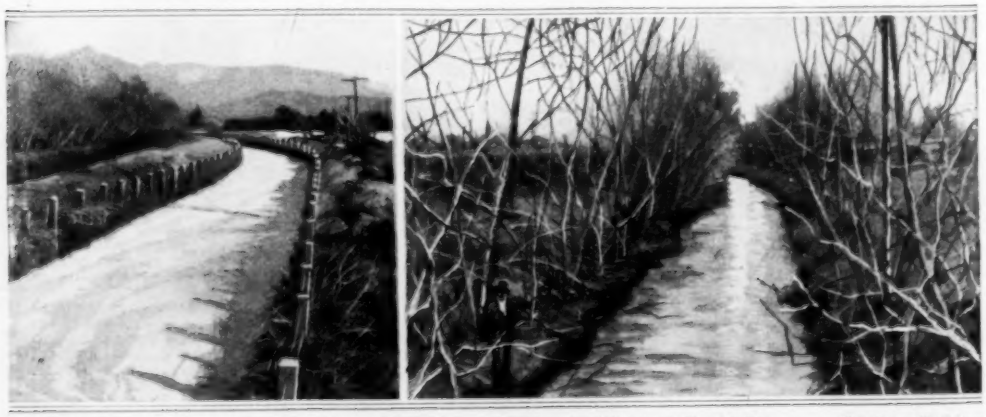


Foolproof Type of Universal Rheostat Taken Apart to Show the Lever Which Interlocks with Circuit Breaker so That When the Latter Is Open the Lever must First be Set at the Minimum Charging Rate to Close the Circuit

with an interlocking underload-and-overload-release circuit breaker, which has a foolproof feature. The underload circuit breaker prevents the battery from discharging back into the line. The other one protects the rheostat, battery, and entire circuit against excessive current. When the circuit breaker is open it is necessary to move the rheostat lever to the position of the minimum charging rate to close the circuit. This prevents its operation by thoughtlessly putting the lever into a position that would cause practically a dead short circuit on the line. Instead he starts at the minimum position and moves the lever up to the point where the breaker will just stay in.

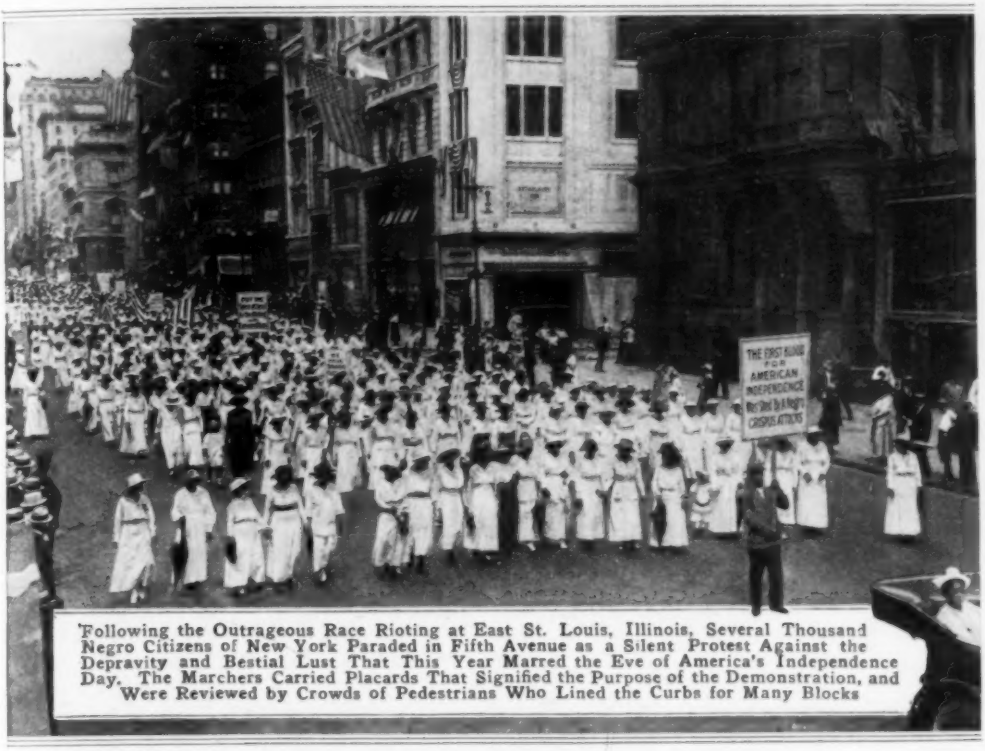
COTTONWOOD POSTS BESIDE DITCH BECOME TREES

In an unusual way nature helped the city of Redlands, Calif., to construct drainage-ditch banks which proved strong enough to restrain the floods that for several seasons had devastated fields adjoining the artificial channel. It was after various futile attempts to strengthen the banks of the ditch, built to carry off water in the rainy season, that the city engineer proposed erecting a barbed-wire fence back of which brush would be piled. Railroad ties were first used as posts in constructing this fence, but later cottonwood posts were substituted, thereby saving the city about 10 cents per post. These were obtained from the material trimmed from the city's cottonwoods at the time the fence was being made. The new barrier proved effective and during the second season, as some had anticipated, the cottonwood posts began to sprout and now they are thriving trees which not only strengthen the walls of the drainage ditch but also add a touch of beauty to an otherwise barren landscape.



Left: Drainage Ditch in the Dry Season, Showing a Section in Which Railroad Ties were Used in Making a Protective Fence. Right: Portion of the Ditch Lined with Cottonwoods That Grew from Posts

PROTESTING AGAINST TYRANNY IN AMERICA



Following the Outrageous Race Rioting at East St. Louis, Illinois, Several Thousand Negro Citizens of New York Paraded in Fifth Avenue as a Silent Protest Against the Depravity and Bestial Lust That This Year Marred the Eve of America's Independence Day. The Marchers Carried Placards That Signified the Purpose of the Demonstration, and Were Reviewed by Crowds of Pedestrians Who Lined the Curbs for Many Blocks

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CITRUS TREES FUMIGATED UNDER CANVAS SHELTERS

In the beautiful citrus groves of southern California it is a common experience during summer and fall, particularly at night, to see long rows of orange or lemon trees shrouded in canvas. These coverings, which at first present an almost weird appearance, are employed in fumigating the trees to kill a destructive scale. The canvas pieces are put in place with poles, or with the aid of special apparatus mounted on a wagon. Hydrocyanic-acid gas, commonly known as prussic-acid gas, is used for fumigating, the necessary ingredients being placed in a vessel that is set inside the shelter and allowed to give off fumes. While this is an expensive expedient, it is a thoroughly effective one.

View in an Orchard, Showing Long Row of Trees Shrouded in Canvas beneath Which Prussic-Acid Gas is Generated to Kill a Destructive Scale: It is Estimated That California Citrus Growers Spend $1,000,000 Annually in Fumigation of This Sort

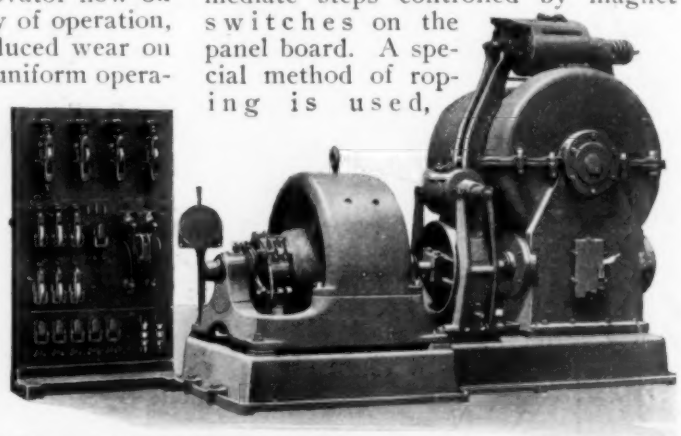
WATER-HEATER EXPLOSION DUE TO CARELESSNESS

The disastrous explosion illustrated herewith, which almost completely wrecked a comfortable bunglow, was caused by failure to turn off a gas heater at a time when various circumstances made possible the accumulation of an excessive amount of steam in the hot-water tank. The accident serves to emphasize the necessity of great care in shutting off a gas heater at the proper time, especially if it is not provided with an automatic cut-off of any kind. In this instance, the pressure regulator on the water-supply pipe had become choked and shut off the flow of water into the heater. The occupant of the bungalow opened a faucet situated in the back yard, while the hot-water faucet at the kitchen sink was open. This resulted in siphoning part of the water from the heater tank. The gas heater was left burning, and in time, enough steam was generated to cause an explosion.

Bungalow Wrecked by Explosion of Water Heater, Caused by Failure to Shut off the Gas

WORM-GEAR TRACTION LIFT OPERATES AT LOW COST

Among the advantages claimed for a worm-gear traction elevator now on the market are simplicity of operation, low starting current, reduced wear on controller switches, and uniform operation under all load conditions while going either up or down. Four wires are all that are required to give full control to the car. A variable speed motor is used. It is claimed that a fully loaded elevator will start with one-half the full-load current and that the current will never exceed the full-load running current by more than 10 per cent—a factor which means a great saving in cost of operation. Acceleration to full speed is obtained in about eight feet of travel. The elevator has but two speeds that are controlled by the switch in the car, but there are intermediate steps controlled by magnet switches on the panel board. A special method of roping is used, whereby the life of the cables is greatly increased.



Worm-Gear Traction Elevator Engine Which Requires Low Starting Current and Is Easy to Operate: Panel Board, Which Is of Comparatively Simple Construction, is Shown at the Left of the Engine

RAILWAY IS FINALLY BUILT TO RUSSIAN ARCTIC PORT

According to recent advices the Russians, after several disheartening and costly failures, have finally succeeded in establishing a three-track railway between Petrograd and Kola Bay, the ice-free arctic port that gives ready access to the Atlantic. About two years ago it was announced that the line was practically ready for operation. Because of incompetent supervision, however, much of the track had to be reconstructed several times. The ties had been laid on the frozen tundra which with the coming of spring turned into a vast morass. One construction train, it is understood, got through to Kola Bay. But before it started back, warm weather caused miles upon miles of the track to sink into endless fields of mud and water.

The first and easiest part of the road was constructed by Russian labor. But when the men were needed at the front, they were relieved by Austrian prisoners who were as ignorant of railway engineering as were the guards placed over them. With the aid of torches they worked in the arctic night, braving hunger, disease, and terrific cold, but accomplishing what was worse than useless. After their first failure they were given better supervision and managed to build what passed for a rock-ballasted roadbed. It was poorly laid and failed to hold up when the spring thaw came. Chinese coolies were then imported and the work done properly. The railroad extends through Petrozavodsk, on Lake Onega, to Ekaterina, on the Murman coast and is known, at least popularly, as the Murman railway. Because of the warm winter climate enjoyed by Kola Bay and parts of the adjacent seas, on account of the Gulf Stream that crosses the Atlantic and flows easterly along the coast of the Arctic Ocean, the port is open to navigation the year around. The military value of the new line is considered to be of much importance to Russia at this time.

WOODEN PLAYERS ARE USED IN BALL-PITCHING GAME

Life-sized, uniformed manikins serve as batter and catcher in a novel baseball concession intended for summer

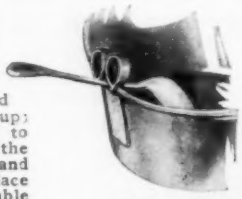
Wooden Manikins Clothed in Uniforms Act as Batter and Catcher for Carnival Patrons of Baseball Concession Game

parks and itinerant amusement companies. The game is played in the usual way for the customary prizes, the patron paying a certain fee for the privilege of throwing three or more balls. The middle part of the chest protector worn by the catcher covers a padded board. When this is struck by a pitched ball, a bell is sounded. The catcher's head is hinged so that it is thrown back when hit. This action operates levers which force the manikin's arms forward as if an attempt were made to catch the ball. When the bat held by the other figure is struck, it swings forward. A player who is able to strike the bat, or ring the bell, three times in succession, wins a prize.

¶A pleasing illustration of the fellowship which men in our new army are experiencing is found in the common ties that are already binding together the soldiers known as the "258's." In many places special social events have been held in honor of these men whose number stands first in the drafted list.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Clamp Fitted with Vacuum Cup: Which Cling to the Surface of the Glass Churn and Hold It in Place on Top of Table



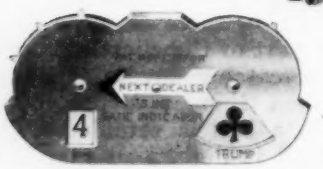
Spoon Holder That may Readily be Attached to Any Ordinary Cooking Vessel: It Saves Much Inconvenience

Just as Convenient as It Is Novel: A Baby Basket That may be Carried on the Arm

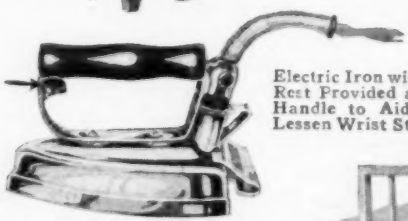
A Brush, Suitable for Hats and Similar Articles, That Is a Bit Out of the Ordinary. Price $2.50

Practical Dish Washers for Family Use Require Only a Few Quarts of Boiling Water. Here Is One Which is Equipped with a Special Heater. Price about $20

Fuel-Saving Aluminum Cooking Receptacle That is Divided into Four Compartments and Provided with a Base That Prevents Scorching. Price $6

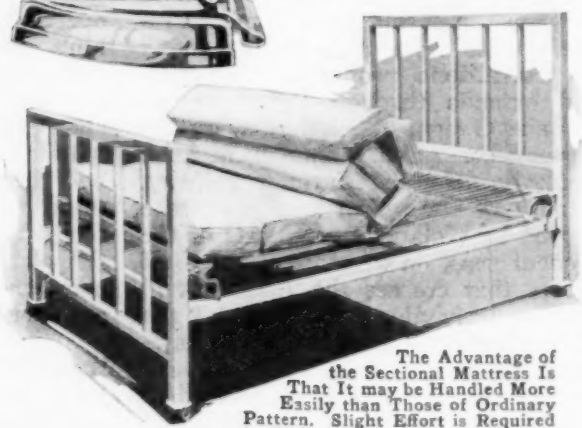


For Card Players Who are Apt to Forget the Trump Suit, Next Dealer, and Amount Bid, This Indicator is Supplied in Nickel, Brass, or Gun Metal for $1.50

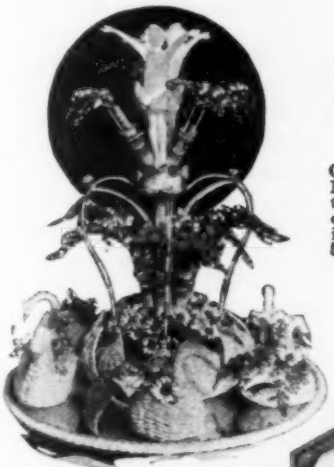


Electric Iron with Special Thumb Rest Provided at Front End of Handle to Aid Operation and Lessen Wrist Strain. Price $4.50

Garment Hanger Decorated with Hand-Painted Portrait of the Idol of One's Affections. Price $1.25

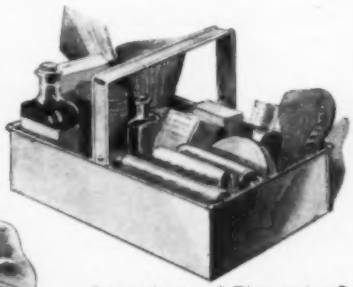


The Advantage of the Sectional Mattress Is That It may be Handled More Easily than Those of Ordinary Pattern. Slight Effort is Required in Rolling It



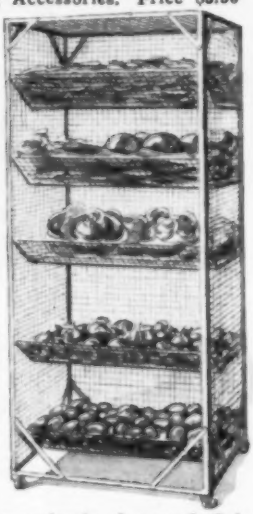
This Ornate Flower Basket is Made of Rope and Intended to Represent an Opening Lily. There Are Numerous Places Where It may be Used

For the Wardrobe or Chest, an Odorizer That Repels Moths and Protects Clothing from Injury during the Months It is Stored. Price 50 Cents

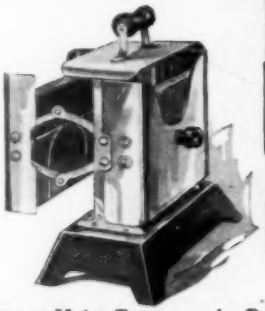


Convenient and Timesaving Is This Metal Basket Which is Divided into Compartments for Dusting, Cleaning, and Polishing Accessories. Price $3.50

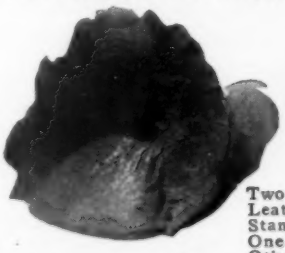
Splendid Utility Kit for Soldier or Sailor. It is Made of Water-Proof Fabric and Contains a Well-Selected Assortment of Standard Toilet Accessories and Personal Articles, Including a Safety Razor. Price $5



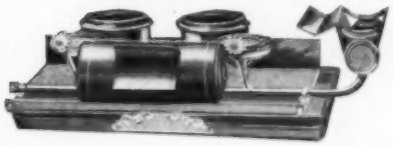
This Conveniently Arranged Galvanized-Wire Rack, Fitted with Inclined Shelves, is Intended as a Vegetable Bin. It Permits Free Circulation of Air and Thereby Prevents Premature Decay of Produce



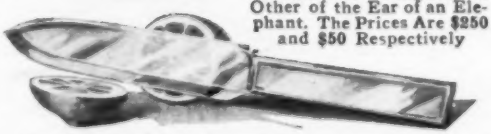
Dry or Moist Toast may be Prepared Quickly with This Appliance. It Has Adjustable Arms That Hold the Bread at the Desired Distance from Heating Element. Price $4.50



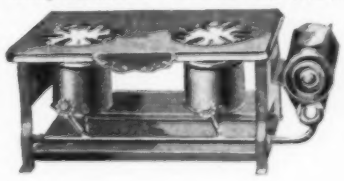
Two Unusual Specimens of Leathercraft: An Umbrella Stand and a Fire Screen, One Made of the Leg and the Other of the Ear of an Elephant. The Prices Are $250 and $50 Respectively



Folding Oil Stove That Is Readily Portable and Therefore Well Suited for Campers, Motor Tourists, and Others

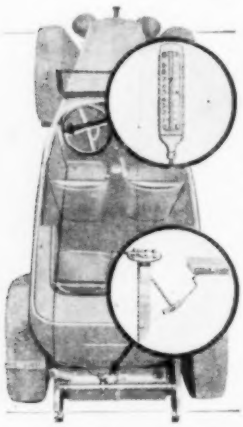


For Cutting Grapefruit, Oranges, and Lemons, a Keen-Edged Knife Made of Special Quality Glass: It Has the Advantages of Remaining Sharp, Never Corroding, and of Being Easy to Wash. Price 35 Cents



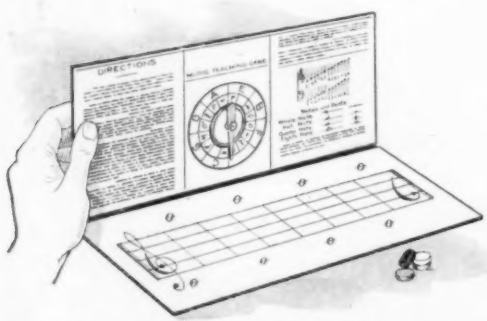
TROUBLE-SAVING GASOLINE GAUGE FOR MOTOR CAR

For the benefit of motorists, a gasoline gauge with an indicator that may be installed on the cowl, or in some other position where it would be readily visible, has been introduced. The accessory is easily installed and is of obvious convenience, especially to the tourist. An elongated dial somewhat similar to that of an ordinary mercury thermometer is used for a scale.



NEW PARLOR GAME TEACHES ELEMENTS OF MUSIC

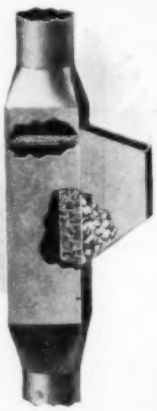
A recently patented parlor game that bears some resemblance to parchesi is designed to teach the players the names and values of musical notes. The board on which it is played is marked with a large staff and each move of the men on this board is determined by spinning an arrow on a dial whose circumference is marked by the seven letters of the scale. The letter to which the arrow points when it comes to rest indicates the next position to which a man must be moved. The path the men follow runs alternately up and down through successive measures. Rests and notes of various values are also marked on the dial. By taking these into account at each move the game can be made more difficult.



Parlor Game Which Teaches the Names and Values of Notes: The Progress of Each Player's Men across the Board is Determined by Spinning the Arrow

SALT DEVICE TO PREVENT DRAIN-PIPE FREEZING

In a recently patented device to prevent the freezing of outside drain pipes, a small hopper filled with rock salt is placed midway of the length of the pipe. The drain water from the eaves trough thus passes in a thin stream over the chunks of salt, so that it becomes a salty solution for its passage downward from the hopper, preventing the usual freezing of the pipe from the bottom up. A few cents' worth of rock salt will last all winter. The plan depends for its success on the fact that the freezing begins at the bottom of a pipe.



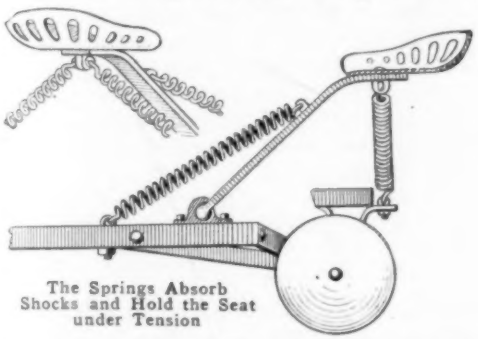
FIRE ENGINE PUMPS WATER TO NEW HEIGHT

In a series of remarkable tests conducted on the Woolworth building in New York City a few weeks ago, the tremendous pumping power of an advanced type of fire engine was demonstrated, when water was forced from the street level to a nozzle located 730 ft. above ground. In one instance 50 ft. of 2½-in. rubber hose was connected with the standpipe at the lofty elevation named, and a nozzle pressure of 67 lb. was attained with an engine pressure of 400 lb. As this skyscraper is the tallest in the world and the water was pumped well up toward

its top, the achievement doubtless establishes a new record for fire engines. It was asserted by firemen participating in the exhibition that the water could have been forced to an even greater height with the same equipment. When the Woolworth building was erected the architects believed that they had outstripped all fire pumps, but these tests show how successfully the designers of fire-engine pumps have kept pace with modern needs.

SAFETY SPRING SEAT MADE FOR FARM IMPLEMENTS

For cultivators and certain other farm implements, a shock-absorbing seat has been devised to protect a driver from severe jolting and to eliminate the danger of his being thrown

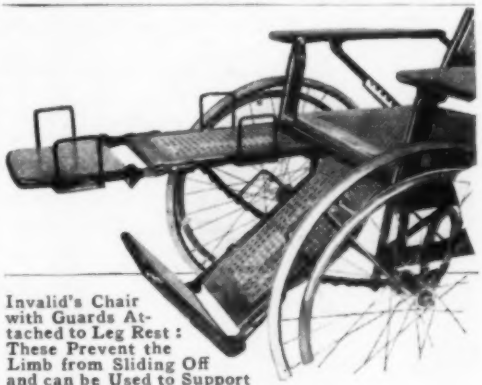


The Springs Absorb Shocks and Hold the Seat under Tension

from a machine. The seat post is pivoted to the tongue and held in position by three coil springs. One of these is stretched between the tongue and the upper part of the seat post, while the other two extend diagonally to either side, connecting the seat and the frame. This arrangement prevents undue movement in any direction and supports the seat without its having a rigid connection.

LEG GUARDS IMPROVE INVALID'S CHAIR

A feature of an invalid's chair which adds much to the comfort of the occupant in case he has suffered the fracture of a leg, consists of metal leg guards that can be attached to either side of the adjustable leg rest. They prevent the limb from sliding off and, if desired, cloth loops can be stretched

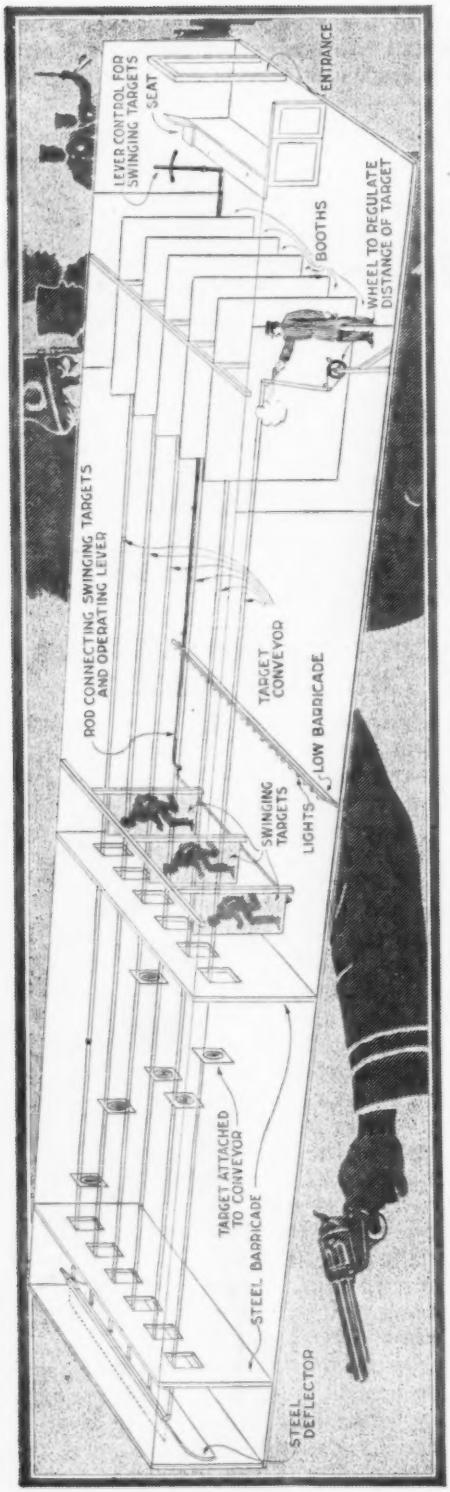


Invalid's Chair with Guards Attached to Leg Rest: These Prevent the Limb from Sliding Off and can be Used to Support Bands of Cloth on Which the Leg can Lie More Comfortably

across from one guard to another, forming a support in which the injured member can rest.

BUGLE USED TO TRANSMIT MILITARY SIGNALS

To surmount the difficulty encountered in signaling by wigwagging with flags and lamps when the atmosphere is foggy, a system has been proposed which would enable a bugle to be used effectively. Messages would be transmitted in code by "dots" and "dashes," and the calls projected for considerable distances by utilizing a portable soundboard designed to be strapped to the back of the bugler. The latter contrivance, which is shaped like a large shell and made of light wood, extends from a man's waist to a point about a foot above his head. It projects the bugle's notes so that they can be heard distinctly enough for signaling purposes at distances of two or three miles, depending, of course, upon the topography of the district.



Pistol Range of Improved Design at Police Headquarters, Wilmington, Delaware: The Sketch Shows the Human-Figure Targets Swung out of the Way While the Marksman Fires at an Individual Target through the First Steel Barricade

IMPROVED RANGE TO MAKE POLICE MARKSMEN

An improved form of indoor range for revolver practice has been installed at police headquarters in Wilmington, Del., to increase the efficiency of the officers as marksmen when called on to use their guns. The new range is 60 ft. long from the firing stand to the rear wall of ½-in. steel plate, and 17 ft. 9 in. wide, accommodating six officers at a time, the firing booths being separated by steel barricades. Midway of the range are three swinging targets representing human figures running. These are operated by a lever at the front end of the range and can be swung endwise out of the way, or removed, at will. Each booth has an operating wheel for regulating the distance of the ordinary individual paper targets, which are attached to a conveyor by which they can be recovered for examination. Two steel barricades are set across the range, with rectangular apertures through which the marksman fires to hit his individual target.

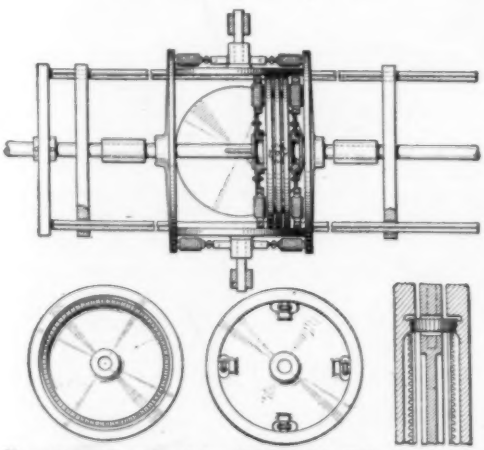
FAILURES IN JELLY MAKING ARE EASILY PREVENTED

In making jellies, guesswork leads to many unnecessary failures and much waste. The Bureau of Chemistry points out how these may be prevented, and sugar—now an expensive article—conserved. To determine accurately the amount of sugar to be used, one should put a spoonful of juice in a glass and add an equal amount of 95-per-cent grain alcohol, mixing the two by gentle shaking. Then slowly pour the contents from the glass, noticing at the same time how the pectin—the substance that makes fruit juices jellify—is precipitated. If it is bound in one lump, a cup of sugar is needed for each cup of juice. If, however, there are several lumps, only three-fourths as much sugar as juice is wanted. When no lump appears and the pectin is merely precipitated, a half cup, or less, of sugar to a cup of juice should be

the proportion. If the test fails to cause precipitation, it indicates that the juice is unsuitable for jelly, and must be combined with some other juice that is rich in pectin, such as apple juice.

FRICTION GEAR PRESSURE SECURED BY MAGNETS

In a new form of friction gear, used with disk drive, the pressure necessary for friction is supplied by a system of magnets, placed symmetrically about the points of contact. The usual practice is to apply pressure behind the disk and along the center line of the shaft holding it. This involves a twisting force to be overcome in the bearing, along with the pressure applied. The magnets used in the new gear insure the pressure coming at each point of contact, at right angles to it, and eliminate pressure from the bearings and also the undesirable twisting force. A self-adjusting feature maintains a constant air gap between the magnets and the disk. Three friction wheels are used, interlocked by a system of differential gearing, in order to transmit more power for a given diameter of wheel. With four disks and the three

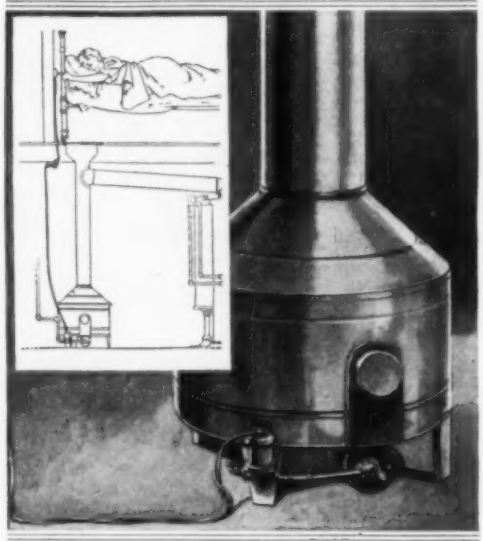


New Method of Applying Pressure in Friction Gear, by Means of Magnets: The Lower Sketches Show the Friction Wheels

friction wheels there are 12 points of contact with pressure constantly maintained by the magnets.

GAS FURNACE CONTROLLED BY ELECTRIC SWITCH

Convenient electrical control is one of the features of a gas heater designed

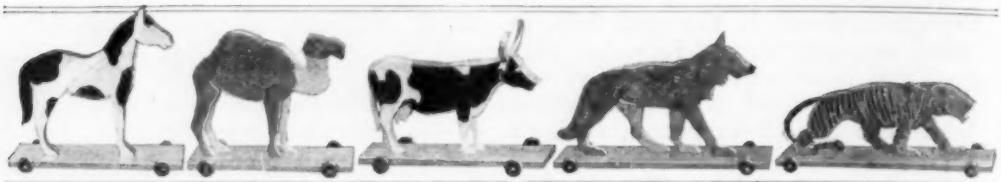


Gas Heater for Warming One or Two Rooms, Which may be Installed in the Basement: It is Controlled by Electric Switches Situated in the Rooms That It Heats

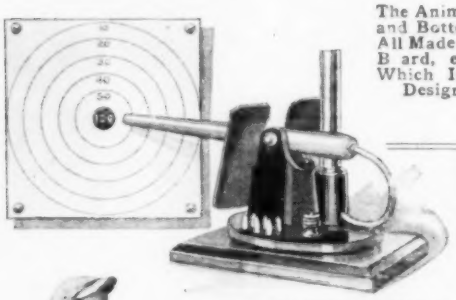
to warm one or two rooms, or to supplement a furnace of insufficient capacity. The apparatus is inclosed in a galvanized-iron cylinder, 2 ft. in diameter and 2 ft. high, and can be installed in the basement, or suspended from the ceiling of a downstairs closet to heat an upstairs room. The air warmed by it is discharged into the rooms through ordinary hot-air shafts. The gas supply is controlled by an electromagnetic valve which, in turn, is operated by a switch, conveniently located. By turning on the switch the valve is opened, whereupon the gas is lighted by a pilot light that burns constantly. Fumes from the heater are kept separate from the warmed air.

¶The public library in Chicago has offered quantities of old periodicals to volunteers who will agree to cut them up and make scrap books suitable for convalescent soldiers, including those that are too weak to handle heavy books.

SOME OF TOYLAND'S NEWEST AND BEST PRODUCTS



The Animals Marching across the Top and Bottom of These Two Pages are All Made of Very Durable Composition Board, except the Funny Bulldog, Which Is of Wood. Skilled Artists Designed and Colored Each One

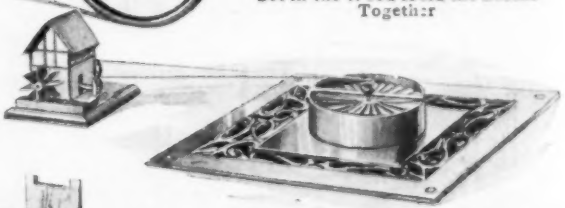


Put One of the Shells in This Cannon and Then Strike the Upright Air Cylinder, and the Piece will Shoot Like a Real Coast-Defense Gun, Which It Resembles

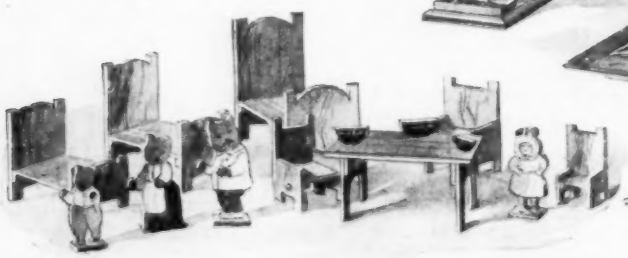
This Doll Almost Talks. Just Pull One of Her Earrings and She will Wriggle Her Tongue as if She were Saying Something

A Child's Car That Affords Lots of Fun and Healthful Exercise: It is Driven by Working the Handle Back and Forth. A Warning Horn, Electric Headlight, and Tail Light are All Provided

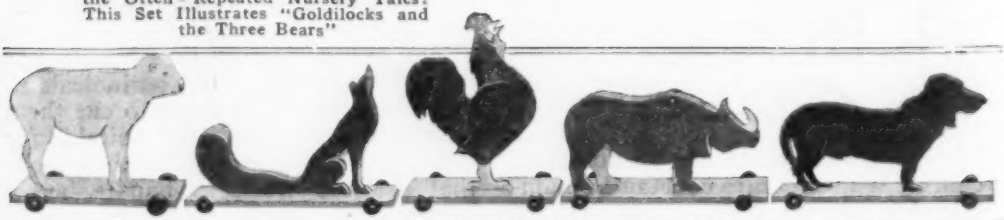
Something New and Fascinating in Building Blocks: Bar Magnets Set in the Wood Hold the Blocks Together



Hot Air Runs This Toy Power Plant. Place It on a Register and It will Drive a Belt for Various Little Machines

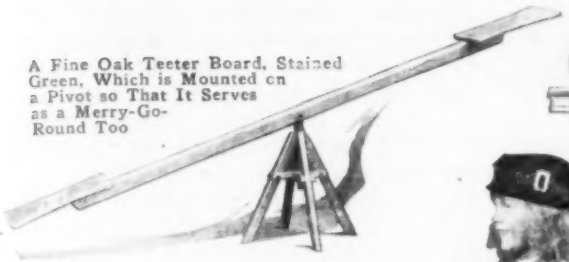


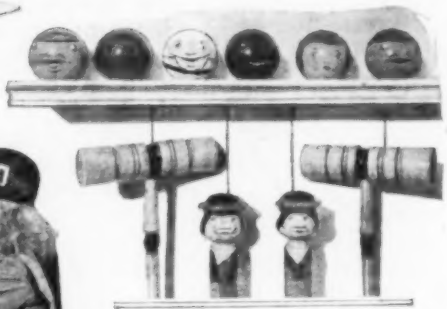
Charming, Durable Toy Figures and Furniture Which can be Used in Telling the Often-Repeated Nursery Tales: This Set Illustrates "Goldilocks and the Three Bears"



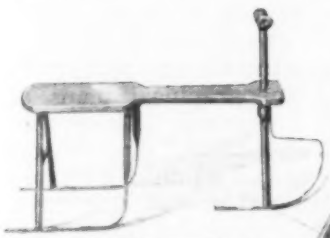
THAT WILL DELIGHT CHILDREN OF VARIOUS AGES

A Fine Oak Teeter Board, Stained Green, Which is Mounted on a Pivot so That It Serves as a Merry-Go-Round Too





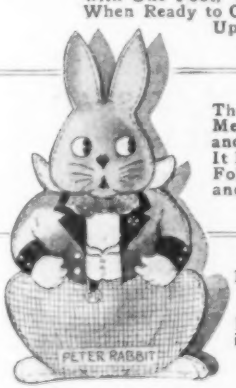
Perhaps Because Each Represents a Character in "Alice in Wonderland," Knocks cannot Keep the Balls in This Croquet Set from Smiling, Though the Stakes Look Quite Stern



A Sled That Baby can Steer: It Is Just the Right Size and There Is Little to Get Out of Order

This Coaster Has a Fine New Feature. The Seat and Post can be Held Down Out of the Way with One Foot, While Getting Up Speed. When Ready to Coast, Move the Foot, and Up Springs the Seat into Place, as Shown

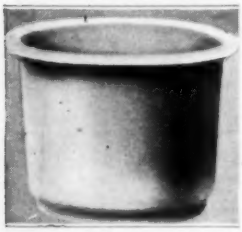
The Sand House on the Right Measures Four by Four Feet, and Because It Has a Canopy It Keeps the Sun off the Little Folks Playing in the Sand, and Sometimes the Rain, Also



Here They have Taken Peter Rabbit, Whom Nearly Every Child Knows, and Made Him into a Little Bean Bag, Brightly Colored and Waterproofed

PRODUCE UPRIGHT BATHTUBS FOR JAPS IN AMERICA

American bathtubs have never met Japanese approval, and as a result a Nipponese tub is now being made for the convenience of the mikado's subjects who are residents of this country. It is provided in different sizes, one of which is 25¾ in. high, 35½ in. long, and 28½ in. wide. The receptacle is virtually a large porcelain-finished bowl.



NEW SYSTEM OF SUSPENDING CARS DISSIPATES SHOCKS

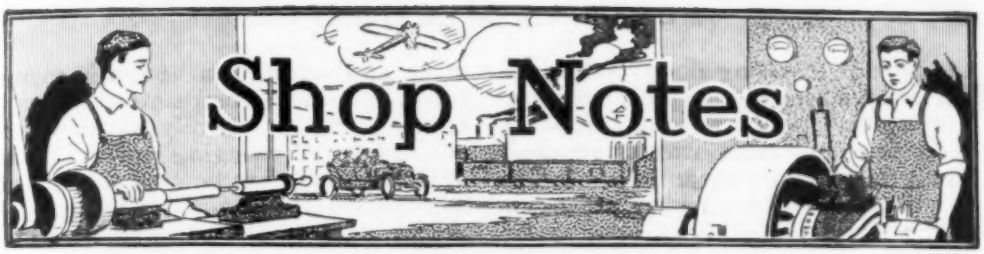
Entirely obviating, according to the claims of the inventor, the need of shock absorbers, a new sort of spring has been developed which is suited alike for pleasure cars and trucks. It replaces the ordinary type of spring and is purported to carry a vehicle over rough roads smoothly and without the usual vibrations and rebounds. In one form it consists of a wedge, supported on the axle, that works between two spring-controlled rollers mounted in a frame attached to the body. In another instance the sides of the wedge are toothed bars against which cogs, instead of rollers, operate. The principle of the device is the same in each case. Coil springs, held horizontally, are employed. Their recoil, after sudden compression, is exerted against the wedge instead of upwardly against the body. This causes the latter to return gradually and without jolting to its normal riding position.

"MOTHER MAPS" GREAT HELP IN ESTIMATING BIDS

Attention has been called by the government to the availability of topographical maps produced by the Geological Survey, and their value to construction contractors, engineers, official boards, and county or state authorities. Mention is made that in some counties where extensive road improvement has been planned, maps showing the locations of material supplies and railway connections have been prepared to accompany specifications and calls for bids. The Department of the Interior points out that when things of this kind are to be undertaken, it should first be learned whether or not the Geological Survey has prepared topographical maps of the regions concerned. These are known as "mother maps," or engineering base maps, and contain far more vital information than any chart that could be specially prepared for the purpose except at prohibitive cost. Pertinent data could be platted on the topographical maps, and the contractor enabled to locate his sources of materials, ascertain the best routes and means of transportation, and thereby have increased confidence in the accuracy of his estimates.

IMPROVED LOCK SNAP FOR HARNESSES

An improved type of lock snap for harness, etc., that is non-fouling and can be easily operated by one hand, has just been put on the market. The mouth of the hook is closed by means of a notched member that is locked in position by a thumb spring projecting from the side of the shank. By pressing this spring the notched member is released so that a ring can be readily inserted into or removed from the hook.

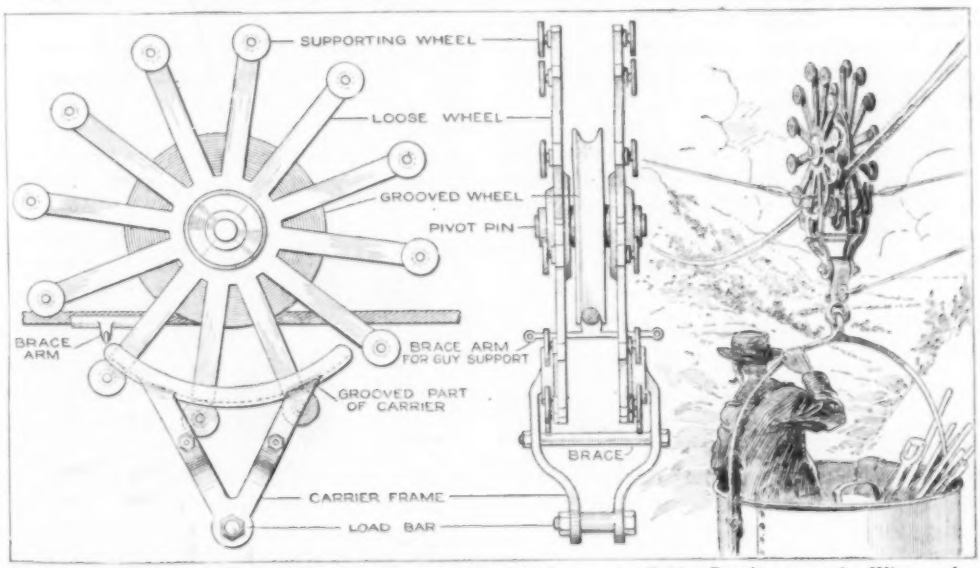


Cable Trolley Rides over Guy Wires in Its Path

By J. S. ZERBE

THERE are many places where it is impossible to run cables for the transmission of carriers for ore or other products around mountain sides, or across gorges, without using guy wires laterally from one or both sides of the cable. The suspension of the buckets, below such a winding and stayed cable, is accomplished by a contrivance in which the trolley wheel, which supports the carrier on the cable, is rigged with two spider wheels and a special carrier frame, as detailed. The pivot pin of the trolley wheel extends out, to receive, at each end, a spider, the arms of which project beyond the periphery of the trolley wheel, as shown in the side view. The ends of these arms, or spokes, are each provided, on their outer sides, with an antifriction wheel. The carrier frame is grooved to ride on these wheels. This frame is built up of two sidepieces, generally triangular. The upper rim of these plates is curved and grooved to ride on the antifriction wheels. These pieces are joined together below the spider by bolts, as shown in the end view. The load is carried on the load bar of this frame. The spiders turn independently of the trolley wheel.

When the trolley wheel moves in either direction, the spider wheels do not turn until one of the arms strikes a cross wire. The cross wire then passes up between the arm which strikes it and the next arm ahead. The action is a stepping over the guy, or cross wire. The carrier passes beneath

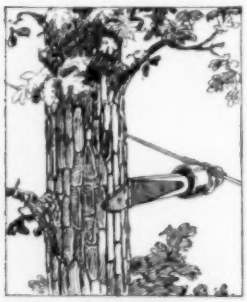


When a Guy Wire is Encountered, the Trolley Wheel Rides on the Cable, Passing over the Wire, and the Load is Carried under the Wire, by Means of the Spider-Wheel Device, Which Supports the Load Carrier

the cross wire, riding along on the anti-friction wheels, as the spiders revolve. The spiders again remain stationary until the next cross wire is reached. The propulsive force can be applied to the pivot pin of the trolley wheel, or to the carrier; in either case the spider will ride over, and the carrier beneath, the guy wires. This arrangement can also be used for a large variety of suspension cable lines for amusement devices, as the lines can be run in many directions in a comparatively small area, and can be laterally supported so as to prevent a swinging motion. Two of these wheels can be used to support motive power, the trolleys being connected by a frame. The carriers are thus self-contained, and useful for transporting products by cable where the usual motive cables are not practical, or economical.

Hinged Insulator Brackets Prevent Breakage of Wires by Swaying

Municipalities with electrolier street lighting often find trouble in keeping the overhead wires from rubbing on trees. The swaying of the trees wears the insulation from the feeder wire, and on wet days produces a partial ground and leakage of current. Steel pins driven into the trees, or wooden brackets spiked on, with the feeder securely tied to the glass, or porcelain, insulator, are unsatisfactory, in many cases causing an almost perfect ground. A simple remedy was devised by attaching a wooden wire bracket to a large hinge, spiked to the tree trunk. The swaying in the direction of the line is provided for in the hinge and the cross swaying in the slack in the feeder wire.—J. F. Bront, Denver, Colo.

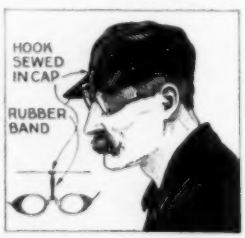


Air Pumped through Water Jacket Cools Gasoline Motor

A four-cycle, water-cooled gasoline engine was installed in a small shop and used only intermittently for small jobs. When the weather became cold, the danger from frost and the job of filling and emptying the tank and jacket caused the operator to devise an air-cooling system for it. Into a collar of suitable size he put a projecting pin, in such a manner that when the collar was put on the end of the crank shaft, the pin served as a crank pin. From this improvised crank pin he operated bellows attached to the floor below. By means of hose, he connected the nozzle of the bellows with the lower water connection of the water jacket. This caused air to circulate through the jacket while the engine was in motion. Frost did not injure it, and it required practically no attention. The method is, of course, hardly feasible on an engine running for long periods.—J. E. McCormack, Haliburton, Ont., Canada.

Weight of Goggles Relieved by Rubber Band

In steel foundries, or shops, where the eyes of the workmen are endangered by flying particles of steel or sand, many of the men do not keep their goggles on as much as they should, because the goggles are heavy, and unless a man is used to wearing glasses continually, the weight on the bridge of the nose is annoying. A light rubber band looped over the bridge of the goggles and slipped into a small hook of a hook and eye, sewed on the edge of the cap or hat band, as shown, relieves the pressure. The adjustment desired can be obtained by moving the cap.—J. A. Fitzpatrick, Altoona, Pa.



Roughening Slippery Iron-Floor Plates

When iron-floor plates become worn smooth, they are dangerous under foot, especially when wet. A method of roughening them slightly is as follows: Mix a small quantity of powdered sal ammoniac thoroughly with fine sand. Sprinkle the mixture over the iron floor, covering it with a thin layer. Dampen the surface with a sprinkling can and permit the material to remain over night, or preferably over a holiday. Sweep up the sand, and it will be found that a rough coating has been formed, which will last several weeks. The process may be repeated until the desired roughness is obtained.

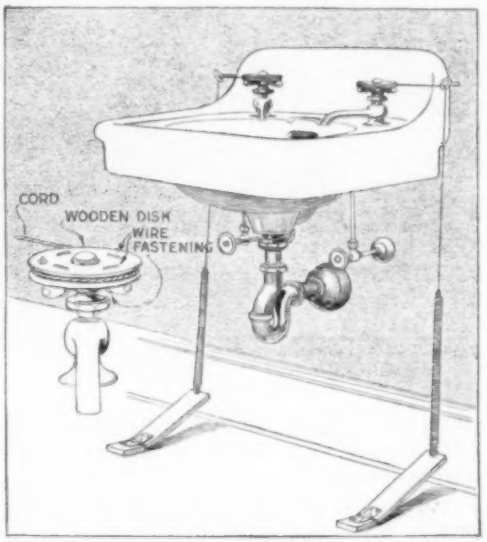
Raised Letters and Designs Painted with Roller

A quick and effective way of painting raised letters, with flat faces like type, or other designs, is to roll over them with a small roller such as printers use in inking type when they pull a proof. The paint is carried on a board, and the roller is covered with paint by running it across the board. In some cities the names of streets, on lamp-posts at the corners, are written in flat-faced white letters, raised, on a background of green, and this method was used with success to paint the letters after the post had been painted green.—Alfred J. Miller, Albuquerque, New Mexico.

Much Time was Saved in Painting Street Signs by This Method

Pedal Controls for Washbasin Faucets

A physician has an ingenious device in his operating room by which he can turn on the water in the lavatory without gripping the handles of the faucets at the washbowl. This is a sanitary feature of importance in his surgical work. The arrangement consists of two pedals fastened to the floor beneath the washstand, and rigged as shown. They are hinged to the floor, and the free ends are held slightly elevated by cords. These cords run through screw eyes in the wall, and are connected to pulleys set on the faucets, as detailed. By treading on either pedal, the corresponding faucet is turned on; when the pressure is released, the spring in the faucets shuts off the water.—John D. Gilbert, Eugene, Ore.

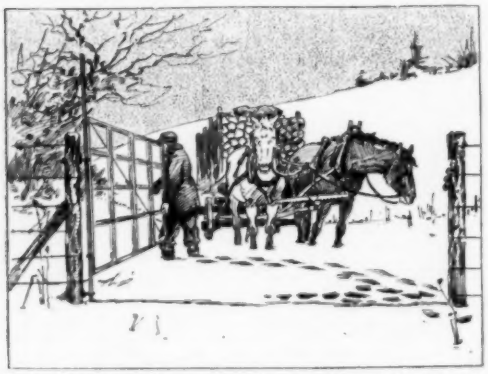


With This Arrangement the Faucets can be Turned On with the Foot, the Hands Not Soiling the Handles

Gate Adjustable to Heavy Snowfall

In regions where the snowfall is heavy, especially on the farm or in suburban places, considerable labor is involved in shoveling away the snow so that gates can be opened at their

usual level. By arranging the gates so that they can be raised above the level of the snow as it accumulates, much of this labor becomes unnecessary. In the arrangement shown, a heavy iron

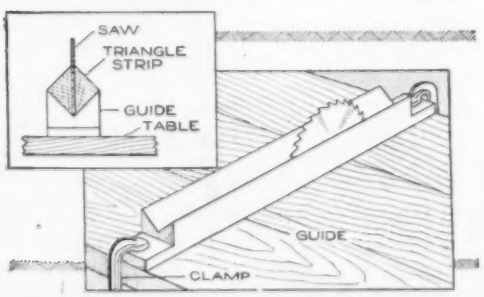


Instead of Shoveling a Path for the Gate at Its Usual Level, It is Raised and Supported on Pins Set in the Long Pipe

pipe, 3 ft. higher than the usual height of the gate, was set in a concrete base and supported by bolts through the fence posts, at the hinged end of the gate. The gate was arranged to slide vertically on this pipe, which supported it from large eyes, or loops around the pipe. Holes bored through the pipe at intervals were fitted with adjusting pins, one for each hinge support of the gate. The gate was quickly raised to the proper level, and the pins set into place.—Ethel S. Platt, Traverse City, Michigan.

Guide for Cutting Triangular Strips on Circular Saw

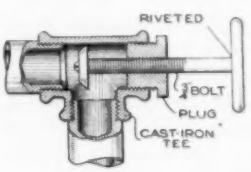
In reinforced-concrete construction the inner corners of the beam and column forms are filled with triangular wood strips, known as fillets. The contractor's circular saw usually is not equipped with a tilting table, and some sort of a jig is required for ripping the fillet strips from the square stock. The sketch shows such an arrangement. A trough-shaped guide, with a slot to accommodate the saw, is clamped to the saw table, and the square stick is pushed along this guide.—J. J. O'Brien, Buffalo, N. Y.



The Guide is Clamped on the Saw Table and the Squared Stock Ripped Diagonally

A Homemade Low-Pressure Angle Valve

A low and medium-pressure valve, that is valuable as an emergency device, and which also gives good service as a fitting for the home workshop, was made of materials easily obtained. This valve possesses points of superiority over some commercial valves, for when the valve is open, the water, etc., passing through the pipes, has an unobstructed flow, and because of its simple construction will appeal to the home mechanic. It is made of a tee in which is fitted at one end a pipe, beveled to form a seat for the valve. In the other end of the tee is a common plug, drilled and tapped centrally for a ¾-in. bolt used as a valve stem. The handwheel is a makeshift, and a plain metal or fiber disk, beveled to fit the valve seat, is fastened to it with a screw. The valve was designed especially for a low-priced tree-spraying and painting machine.—J. B. Murphy, Plainfield, N. J.



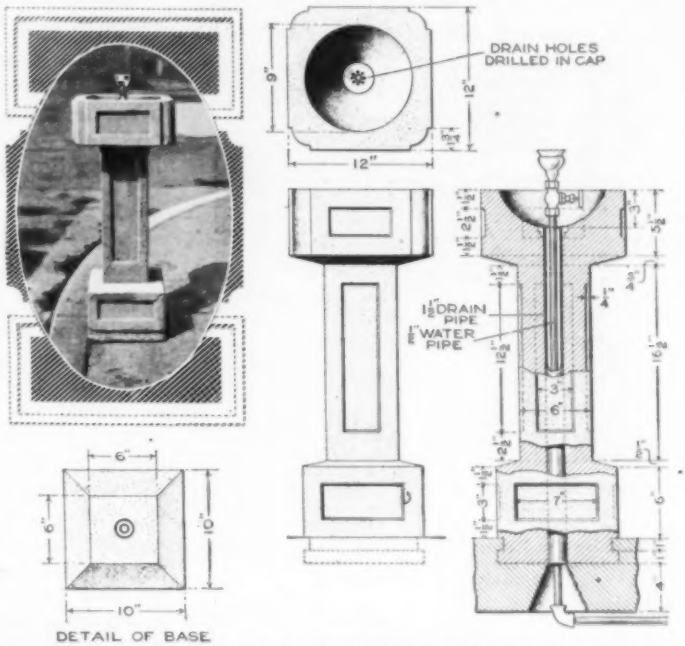
Scraping Dirt from Piston-Ring Grooves

I put in many piston rings in automobile-repair work, and as it is quite a job to scrape carbon from ring grooves, I use a section of a broken piston ring as a scraper. It is fitted in a file handle, and scrapes both the sides and bottoms of the grooves.—Irl R. Hicks, Centralia, Mo.

A Sanitary Drinking Fountain of Concrete

By GEORGE E. TONNEY

BUBBLING drinking fountains are being installed on the sidewalks by many cities throughout the country, but because of the expense fewer than needed are often provided. By making forms for a substantial, artistic fountain of standard design in concrete, like that shown in the illustration, these public conveniences can be built at small cost. The mold, as detailed, is adaptable to a large variety of designs. It is built up of wood, joined together at the four corners in a miter joint, and the sections are held together, while the form is in use, by a top and a bottom plate, and wires twisted around the shaft portion of the mold. The concrete is poured in through an opening in the upper frame, or plate. For quantity production, several duplicate forms may be made. The water-feed pipe is incased in a 1½-in. drain pipe, cast into the mold when the concrete is poured in.



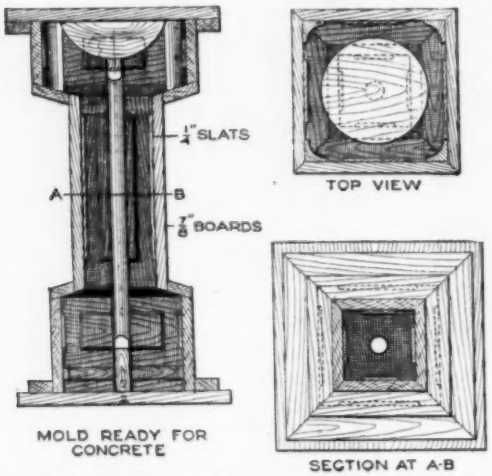
This Substantial and Artistic Sidewalk Bubbling Drinking Fountain was Made in a Simple Wooden Form, Which can be Adapted to a Large Variety of Designs

The construction of the fountain, detailed briefly, is as follows: Lay out a full-size sketch of the fountain, as shown in the sectional view of the working drawings. This can be done handily on a wide board, or on a long strip of wrapping paper. Indicate both the front and top views, and then lay out the parts of the wooden form, as detailed in the top view and the vertical section of the mold ready for the concrete. The wood used is ⅞ in. thick. Care must be taken in laying out this drawing carefully, especially as to the joining of the pieces, which are arranged to be nailed handily. In shaping the pieces make all the light strips at the same time, cutting a board long enough for all the shorter sections of each variety. Fit the pieces to the full-size drawing, and cut them, for the corner joints, in a miter box. Smooth the inner surfaces of the pieces carefully before nailing them together.

When the outer ⅞-in. boards are shaped and fitted for the four sides, nail them together, driving the nails part way in, and fit the sides together. Then make the top and bottom frames to hold the sides in place. If the joints fit snugly, drive the nails in and set their heads slightly below the surface.

Before putting the panel blocks into place, smooth off the inner surface of the mold and sandpaper away all the sharp corners. Then make the panels, which are ¼ in. thick. Nail them into place, centering them carefully on the sides of the sections. The panels should be beveled slightly, so as to withdraw readily from the concrete. Fill all of the nail holes smoothly with plaster of Paris. Make a wooden block

for the basin at the top of the fountain, and arrange it to be set on top of the pipe, which is adjusted carefully in the center of the mold and held in place by nails driven into blocks set in the ends. A tin pan may also be used to form the



In Making the Forms, a Full-Sized Diagram is Laid Out and the Pieces of Wood Fitted Accurately to the Drawing

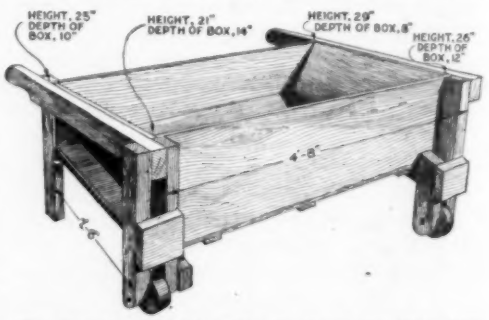
basin. Apply two coats of shellac, sanding them lightly when dry, on all surfaces of the mold which come into contact with the concrete. If the mold is to be used repeatedly, it will pay to use extra-good wood, preferably pine, and to soak the wood in oil.

If the form is properly made, little difficulty should be experienced in setting it up and pouring the concrete. Apply a uniform coat of linseed oil to the inside of the form. Bind the center portion of the form tightly with heavy wire, and set the top and bottom frames securely into place, tacking them with light wire nails. Mix a 1:3 mixture—one part Portland cement to three parts coarse clean sand—making it quite wet. Pour in the mixture, and jar the mold slightly to insure that the concrete runs into all the corners. Permit the fountain to dry at least 48 hours, in a cool, dry place. Remove the form carefully, tapping it slightly to prevent any of the corners from breaking. Repair any breakage or holes by filling the spots with the mixture. Wet the fountain for several days, while it is permitted to dry thoroughly. If desired, the surfaces may be tooled smooth by applying a paste of cement.

Provision is made in the mold for locking the fountain securely into the concrete sidewalk, as shown in the sectional view. The fountain is set in a recess in the sidewalk, 2 in. deep, and concrete surfaced around it to the lower edge of the paneled base.

An Improved Mixing Box for Mortar or Grouting

In repairing a roadway, the varying levels and the crown from the curb to the center made it awkward to use a box of the ordinary construction, mounted on wheels, for mixing the grouting and moving it from place to place. When the box was nearly full, the varying level of the material caused splashing and spilling. A special mixing box was therefore constructed, the principle of which can be adapted to mixing boxes for various uses. The mixing trough was constructed so that the mixture flowed to one corner, which was the deepest. The top of the box was so arranged, by varying the height at the four corners, that it was level



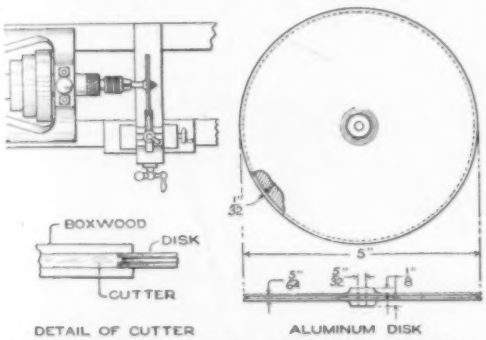
The Varying Height of the Supports for This Mixing Box Made Possible the Transporting of a Large Load without Spilling

in spite of the curve of the roadway when the box was transported, the back end being raised.—J. E. Cahill, Jr., New York, N. Y.

¶Do not force a tap that binds, but remove it and determine what is the cause, or a broken tap may result.

Cutting Grooves in the Edges of Thin Disks

Having to make slots, 1/32 in. wide by 1/32 in. deep, in the edges of a number of 5-in. disks of aluminum, 5/64 in. thick, to carry fine steel wire, we used the following method: First, in the tool post was fitted a piece of boxwood with a slot, 5/64 in. wide and 1/4 in. long. Over this was placed the special cutter which had a point, 1/32 in. wide and 1/32 in. long, projecting beyond a shoulder, which acted as a gauge for depth. The slot in the boxwood guide was just a snug fit for the thickness of the disks. As the holes in the disks and their hubs were but 5/32 in., and there must be no vibration, such a method became necessary. When all was ready, a very slight turn of the end screw on the lathe moved the carriage slightly toward the chuck. This

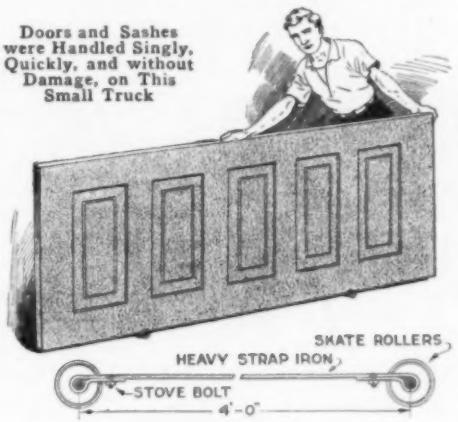


These Aluminum Disks were Grooved on Their Circumference by Rigging a Special Tool, as Shown

kept the disk absolutely true. We drove the disks 3,000 revolutions per minute, and as the cutter fed slowly forward, a hairlike thread of aluminum came almost unbroken up to the full depth. Under a magnifier, the slot showed a polished surface.—L. M. Drake, Daytona, Fla.

Roller-Skate Truck Saves Carrying Doors and Sash

In a sash-and-door factory, much time and labor was saved in moving doors, and similar products, by the use of a small truck made of a roller skate. The four wheels, with the two axles, from an old roller skate were removed, and the distance between them lengthened by a strip of strap steel, about 4

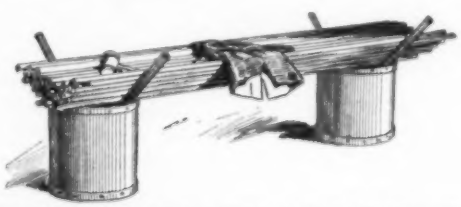


Doors and Sashes were Handled Singly, Quickly, and without Damage, on This Small Truck

ft. long. This was bolted to the center of the two axles, as shown. The doors were quickly shifted singly, in spaces where a large truck could not be used. —Dale R. Van Horn, Milton, Wis.

Stock Racks for Rods and Pipes Quickly Devised

On a large machine job, where a great quantity of steel rods had to be handled quickly, it was found that the necessary racks were not available in the shop. As the work was only temporary, it was not desirable to make additional racks, and a makeshift was devised. Steel kegs, or drums, used in the shop were set up in pairs, and lengths of iron pipe, or rod, set in them to form a rack, as shown in the sketch.

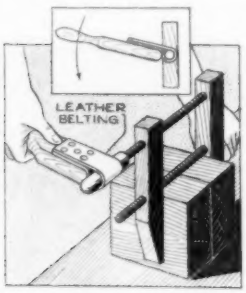


This Method of Storing Pipes or Rods Temporarily can be Adapted Widely, Using Wooden Kegs or Boxes if Necessary

The arrangement proved very efficient, it being easy to transport the pipes and kegs from place to place, as needed. —Charles Doescher, Waterbury, Conn.

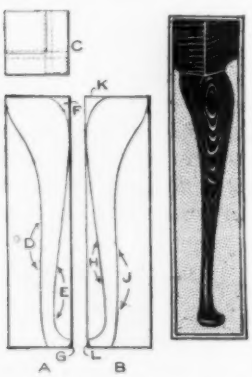
Leather Wrench for Tightening Screw Clamps

Many workmen, especially those who make use of the common wood clamps only occasionally, blister their hands in attempting to tighten up the screws on hand clamps of the cabinetmaker's type. In order to avoid this, a handy tool can be used, that is made of a strip of leather belting fastened to a handle with screws, as shown. The leather loop acts as a wrench, and the clamp screws can be tightened as securely as desired by the use of this tool.—Henry Wedde, Chicago, Ill.



Band-Sawing Cabriole or Curved Furniture Legs

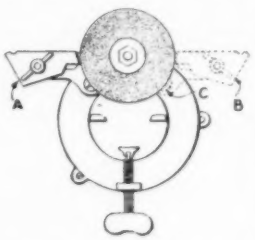
Among the many pieces of work brought into a job shop, or undertaken by the ambitious home cabinetmaker, one which is perplexing to the workman who undertakes it for the first time, is the band-sawing of a Dutch or cabriole leg. A pattern for the work is desirable. The outline is marked upon two adjoining sides of the stick from which the leg is to be sawed, as indicated at A and B, C being a top view. The cuts D, E, F, G, should be sawed first. Cut each piece whole, and lay it back in the place from which it came, to provide a true surface upon which the stick may rest while the other sides are being sawed. Each piece may be held in place by hand, by fastening with small brads so the saw will clear them, or by gluing them lightly. The latter is the best method if time permits. Next saw through H, J, K, and L.



After band-sawing the leg, it will be square in section, and often a leg of this sort is finished this way. If finished round, as in the sketch, careful work is necessary to make the sweeping curves without destroying the proportions and outlines of the leg.—Charles A. King, East Kingston, N. H.

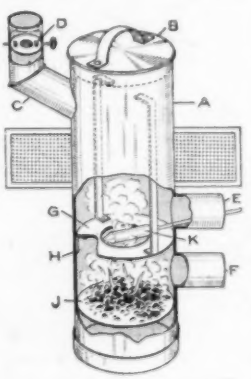
Changing Grinder to Left-Hand Drive

A hand grinder which I used in my home shop was arranged so that the grinding was done with the left hand, while turning a crank with the right hand, in using the tool rest. I drilled a hole and tapped it, as indicated at C, so that the tool rest may be used either at A or at B. The grinding may thus be done with either hand, as is convenient.—Hugo Kretschmar, West Nyack, N. Y.



An Improved Charcoal Soldering Furnace

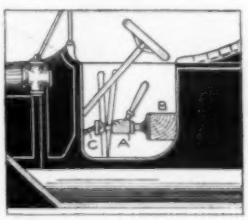
This soldering furnace, which I made and have used for some time, is quite an improvement over the old kind. To make it, obtain a can, A, 6 or 8 in. in diameter and 18 in. tall, with a lid, B. Rivet on a piece of 2-in. sheet-iron pipe, C, having a damper, D, as shown. Next rivet on two pieces of pipe, 2 in. in diameter and 3 in. long, E and F. Fit a piece of sheet iron, G, inside of the pot, provid-



ing lugs, H, for riveting it to the can at three places. Cut a 4-in. opening in this, and rivet it just below pipe E. Put a charcoal fire in the bottom J, and it is ready for use. The soldering iron K is inserted through the pipe E. As considerable air goes in at E, the handle of the iron will not heat easily or burn. The draft for the fire goes in at pipe F. The copper itself will heat more quickly, owing to the intensity of the heat through the hole H.—R. S. Matzen, Fort Collins, Colo.

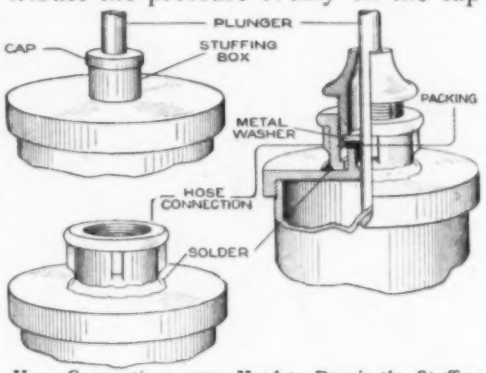
One-Man Method of Adjusting Auto Foot Brakes

Many automobile owners neglect the close adjustment of foot brakes, causing needless expense and possible danger. The principal reason for such neglect is that it usually takes two men to adjust the brakes successfully. One presses the pedal, while the other tests the wheels to insure even breaking power. One man may easily and successfully adjust the brakes with the use of a jack, as shown in the illustration. The jack A, with a block, B, to protect the seat, is placed between the seat and the brake pedal C. The jack is applied to the desired pressure on the brake pedal, and the proper adjustments made.—Koerner Rombauer, Prescott, Ariz.



Repair for Air-Pump Stuffing Box

When the fine threads of the brass stuffing box on an air pump became so worn that they no longer held, the following method of repairing it was used: The stuffing-box cap was removed and its threads filed down until they cleared the inner threads. Two hose connections were procured, and one soldered into place, as shown in the sketch. The other was screwed into place with a metal washer between it and the stuffing-box cap, so as to distribute the pressure evenly on the cap

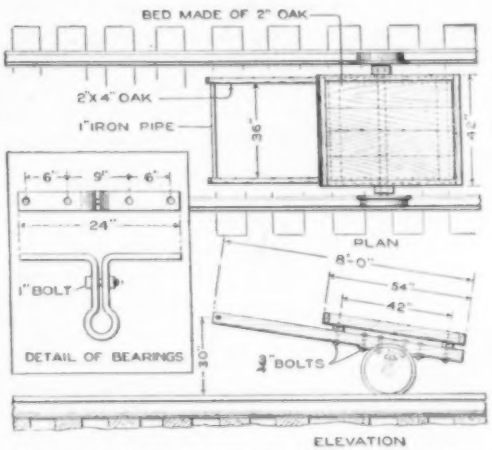


Hose Connections were Used to Repair the Stuffing Box, Making It Quite Serviceable

head. The repair proved even stronger than the original arrangement.—James M. Kane, Doylestown, Pa.

Handcart for Railway Tracks

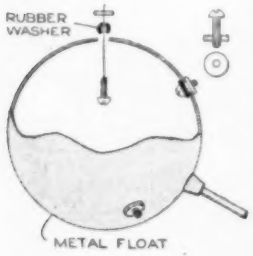
For use in repair work on tracks and other railway equipment the handcart shown in the illustration was found convenient. It is strongly built of oak and mounted on an axle fitted to a set of flange wheels. The frame is supported on the axle by means of two bearings of strap iron, formed as shown in the detail, and bolted to the frame.—Roy H. Poston, Flat River, Missouri.



Heavy Loads are Carried on This Cart for Railway Repair Work

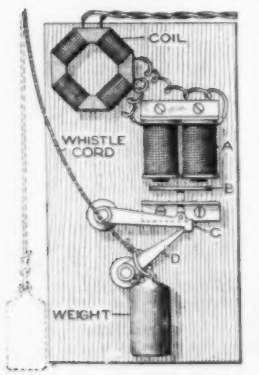
Stopping a Hole in a Hollow-Metal Float

A simple and effective method of repairing a leak in a float is as follows: Ream out the hole in the float to the size of the head of the 3/16 by 1/2-in. stove bolt used. Tie a piece of string to the bolt, as shown; push the bolt into the ball, and place the washer over the string. Double the washer and force it through the hole in the float. Pull up the bolt through the hole in the washer, and screw on the nut. The bolt will not turn, and considerable pressure can be put on the nut without pulling the washer through the hole.—James E. Noble, Portsmouth, Ont., Can.



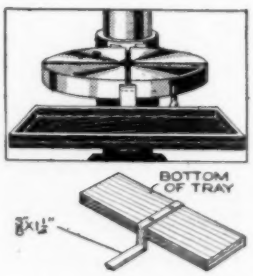
Fire or Warning Whistle Operated by Electric Release Weight

A reliable electric trip for a fire whistle, suitable for small towns or villages, was constructed as shown in the diagram. The weight fastened to the whistle cord is hung on a lever, D. This lever is held in place by a hook, C. Both the lever and the hook pivot on bolts. A magnet coil, A, is placed directly above the hook, and its armature, B, is attached to it by a short connecting rod. When the current is turned on, the magnetic action in the coil lifts the hook, allowing the lower lever to drop. The whistle weight then slides off the lever, opening the steam valve, and blowing the whistle. The controlling switch may be located at the local telephone exchange or city hall. When an alarm of fire is telephoned in, the telephone operator turns on the switch and immediately the whistle sounds the alarm. When the weight is replaced, the device is in readiness for the next alarm. The device may be arranged on the ordinary 110-volt circuit with suitable fixtures. Various kinds of warning whistles may be similarly controlled.—P. E. Bertram, Crystal Lake, Illinois.



Drill-Press Table Supports Tool Tray

Many times when using a drill press, the job takes nearly all of the table, and there is no room for calipers, gauges, etc., without danger of losing them. I have found a little table, made as shown in the sketch, very useful. A bar of iron or steel, to fit the slot, is bent with an offset so that the top of the tray set on it will be below the top of the drill-press table. A wood tray is fastened to it by two round-head bolts. The tray can be used on the table where most convenient, and laid aside quickly when not needed.—Alfred E. Carter, Providence, R. I.

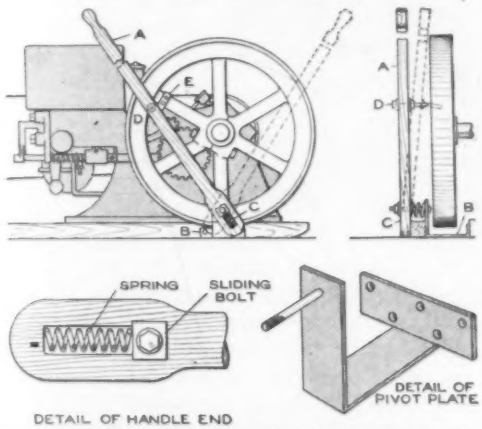


A Starting Handle for Small Gas Engine

A neighbor who had a 4-hp. pumping engine, was often away when water was needed, and, as his wife could not turn the flywheel over to start the engine, he rigged up a device for starting the engine and the pump without any undue effort. A hardwood lever, A, of a length twice the diameter of the flywheel, was fitted as shown. The lever is wider at the bottom, and through the center is sawed a slot as detailed. The pivot plate B was made by a blacksmith. It just clears the

rim of the flywheel. A coil spring is fitted between the pivot bolt and the bottom of the slot, at C.

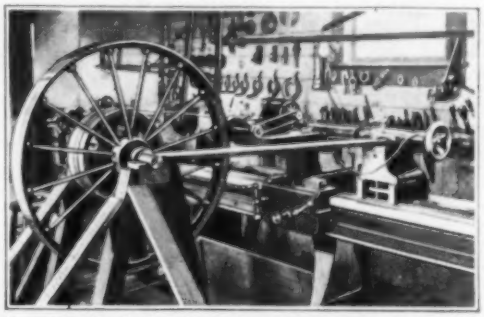
To install the device, turn the engine until the compression point is reached, and one spoke of the wheel is slightly raised above the horizontal. Then fasten a pin, E, to the spoke, about 2 in. in from the rim, and a bolt, D, to the lever to engage the pin at this point. The operation is simple. Turn the wheel to compression, engage the bolt D over E, on the under side of the spoke, and pull sharply forward by the handle. As the rim rises in its revolution, the bolt follows it by means of the slot and spring regulation in the lower end of the lever. The bolt D is forced out from its place at the pin E by the action of a second coil spring at the bottom of the lever, eliminating any danger if the grip on the lever is released too soon. When not in use the lever is laid on the floor beside the motor.—L. B. Robbins, Harwich, Massachusetts.



An Engine, Too Heavy to be Started Handily Except by a Strong Person, was Rigged with a Starting Lever That a Woman can Use

Large Wheel Refaced on Lathe Rigged as Grinder

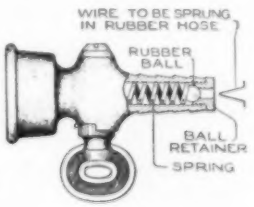
Machinists in small communities, where there is not sufficient work to install machinery for many kinds of jobs, often have their ingenuity tested. The photograph shows how a job, which many machinists, without special equipment, would have given up as impossible, was done. The wheel on the framework is one of two used for a band saw to run on. The machine had been left out in the weather until the surface was rough and uneven. It was necessary to dress the face, and the shop had no equipment for handling work of that size. The job was accomplished by fitting a shaft into the wheel, fitting a drive pulley onto the same shaft, and squaring the arrangement up in front of the lathe. A belt was run from the revolving shaft of the lathe to the drive pulley, thus putting the large wheel in motion. An emery wheel, operated by an individual motor, was then fastened on the lathe, on an adjustable shelf, and put in contact with the moving wheel. By this method a perfect face was put on the two wheels.—Elbert Bede, Cottage Grove, Ore.



By This Simple Yet Ingenious Arrangement a Special Machine Job was Accomplished in Spite of Very Limited Equipment

Safety Gas Cock with Ball Valve

A simple appliance can be made from any ordinary gas cock insuring a more nearly safe connection with a rubber hose, when the latter is accidentally pulled from a gas heater, or stove, unnoticed. A coil spring and a small rubber ball, with retaining collar, are fitted, as shown. When the hose is removed from this gas cock



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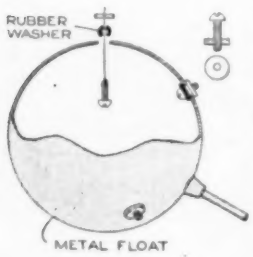

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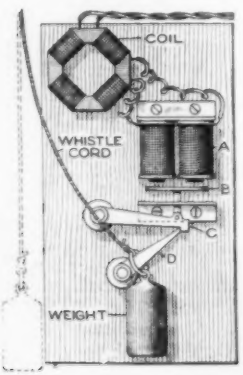
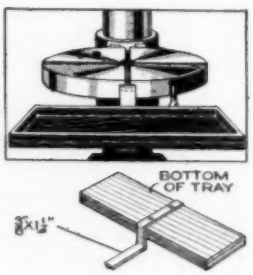


Drill-Press Table Supports Tool Tray

Many times when using a drill press, the job takes nearly all of the table, and there is no room for calipers, gauges, etc., without danger of losing them. I have found a little table, made as shown in the sketch, very useful. A bar of iron or steel, to fit the slot, is bent with an offset so that the top of the tray set on it will be below the top of the drill-press table. A wood tray is fastened to it by two round-head bolts. The tray can be used on the table where most convenient, and laid aside quickly when not needed.—Alfred E. Carter, Providence, R. I.

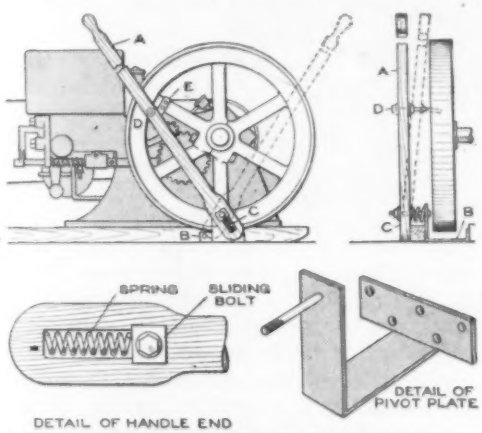


A Starting Handle for Small Gas Engine

A neighbor who had a 4-hp. pumping engine, was often away when water was needed, and, as his wife could not turn the flywheel over to start the engine, he rigged up a device for starting the engine and the pump without any undue effort. A hardwood lever, A, of a length twice the diameter of the flywheel, was fitted as shown. The lever is wider at the bottom, and through the center is sawed a slot as detailed. The pivot plate B was made by a blacksmith. It just clears the

rim of the flywheel. A coil spring is fitted between the pivot bolt and the bottom of the slot, at C.

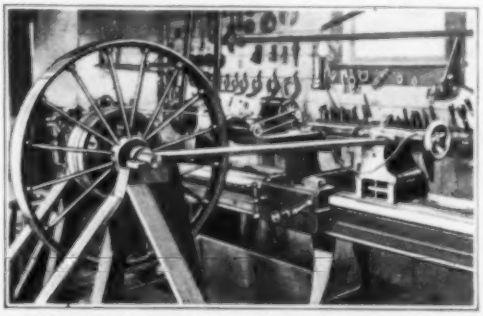
To install the device, turn the engine until the compression point is reached, and one spoke of the wheel is slightly raised above the horizontal. Then fasten a pin, E, to the spoke, about 2 in. in from the rim, and a bolt, D, to the lever to engage the pin at this point. The operation is simple. Turn the wheel to compression, engage the bolt D over E, on the under side of the spoke, and pull sharply forward by the handle. As the rim rises in its revolution, the bolt follows it by means of the slot and spring regulation in the lower end of the lever. The bolt D is forced out from its place at the pin E by the action of a second coil spring at the bottom of the lever, eliminating any danger if the grip on the lever is released too soon. When not in use the lever is laid on the floor beside the motor.—L. B. Robbins, Harwich, Massachusetts.



An Engine, Too Heavy to be Started Handily Except by a Strong Person, was Rigged with a Starting Lever That a Woman can Use

Large Wheel Refaced on Lathe Rigged as Grinder

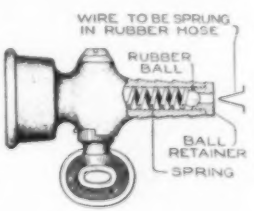
Machinists in small communities, where there is not sufficient work to install machinery for many kinds of jobs, often have their ingenuity tested. The photograph shows how a job, which many machinists, without special equipment, would have given up as impossible, was done. The wheel on the framework is one of two used for a band saw to run on. The machine had been left out in the weather until the surface was rough and uneven. It was necessary to dress the face, and the shop had no equipment for handling work of that size. The job was accomplished by fitting a shaft into the wheel, fitting a drive pulley onto the same shaft, and squaring the arrangement up in front of the lathe. A belt was run from the revolving shaft of the lathe to the drive pulley, thus putting the large wheel in motion. An emery wheel, operated by an individual motor, was then fastened on the lathe, on an adjustable shelf, and put in contact with the moving wheel. By this method a perfect face was put on the two wheels.—Elbert Bede, Cottage Grove, Ore.



By This Simple Yet Ingenious Arrangement a Special Machine Job was Accomplished in Spite of Very Limited Equipment

Safety Gas Cock with Ball Valve

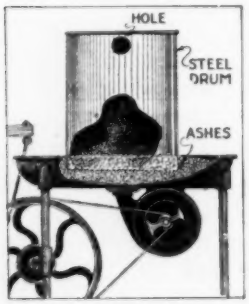
A simple appliance can be made from any ordinary gas cock insuring a more nearly safe connection with a rubber hose, when the latter is accidentally pulled from a gas heater, or stove, unnoticed. A coil spring and a small rubber ball, with retaining collar, are fitted, as shown. When the hose is removed from this gas cock



the rubber ball springs in place, stopping the flow of gas. The wire set in the end of the hose pushes the ball from the opening when the hose is attached. —A. H. Hale, Brooklyn, N. Y.

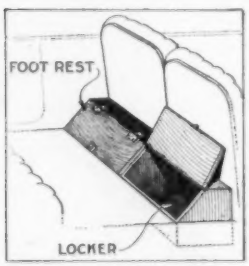
Hood Confines Forge Fire for Intermittent Use

Having trouble with the fire going out in a portable forge, as soon as I left the blower, I overcame the trouble by fitting a 100-lb. sheet-steel, white-lead drum over the fire. A 2-in. hole was cut in one side close to the bottom. To hold the fire for some time, I heap the coals in the middle of the forge, place the drum over it, and press the rim firmly into the ashes around the fire. The fire inside is protected from drafts, and will keep for a long time.—Dennis L. Wilson, Orr's Island, Me.



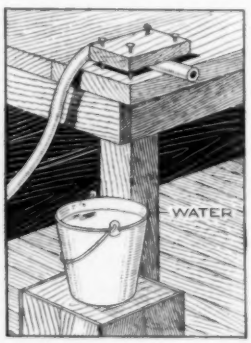
Foot-Rest Locker Built into Auto Tonneau

A locker set crosswise in the tonneau floor of an automobile, just behind the front seats, and fitted with hinged covers, inclined at the correct angle to make them serve as comfortable foot rests, is a practical feature that the autoist, himself, may install. The covers and the top of the locker are bound in brass and carpeted with the same material used on the floor of the tonneau. Each lid is fitted with a lock, and the compartment is subdivided as desired. It extends to a depth of 3 or 4 in. below the floor level. Robes can be locked up to prevent theft when the car is left unguarded, and one of the chambers can be used for carrying the pump, jack, and other frequently used tools, which, if stored under the back seat, cause considerable inconvenience to the passengers. Where the drive shaft interferes, a space can be left for it.—Winsor R. Davis, New York, N. Y.



Attaching a Hose Coupling with a Vulcanized Joint

A good method of fastening a metal splicer in rubber hose is one by which the coupling is, in effect, vulcanized into the end of the hose. Support the end of the hose securely, as shown, clamping a block of wood over it with nails. The hose can also be held in a vise. Hold the coupling with a pair of pliers, and heat it in a flame to a dull red. Then the hot coupling is thrust into the end of the hose, where it will stick, and immediately the hose end, with the coupling, is soused in cold water. The rubber has, after a fashion, been vulcanized to the metal. Then, after the usual wire, or spring, clamps have been applied, on the outside of the hose around the coupling, the metal will, under ordinary conditions, give no further trouble from coming out.—R. A. Talbot, Omaha, Neb.



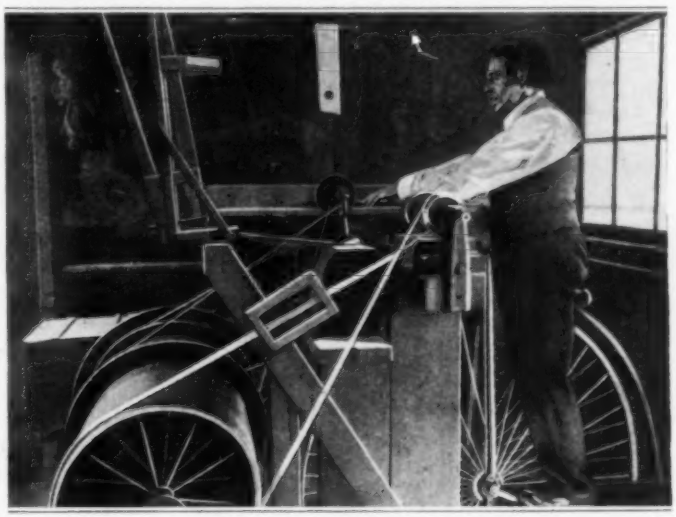
Refacing Jaws of Wooden Clamps

When the jaws of wooden clamps become "chewed up" from heavy use, new life can be given to the clamp by cutting away the inner faces of the jaws along the whole length, deep enough to remove the marred parts. Another way is to cut out about ¼ in. in the front end of each jaw, and fasten in pieces of fiber, or wood.

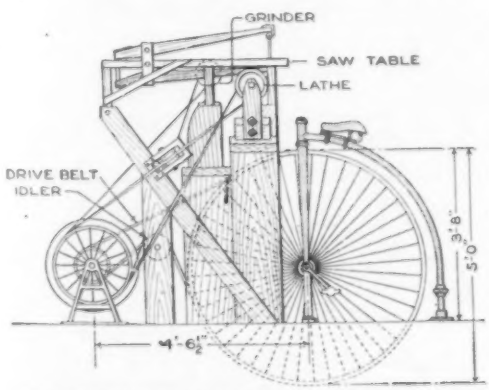
Combination Turning, Sawing, and Grinding Machine

By HENRY L. COOLIDGE

SIX different kinds of machine work can be done on a combination job-shop machine, which I rigged up from an old high-wheeler bicycle: a circular-saw table rips lumber up to 1¼ in. thick and crosscuts stock nearly as thick; a molding-cutting attachment on the saw spindle cuts various kinds of wood moldings; the emery wheel does general grinding, and the lathe, and scroll saw perform the usual work done on these machines, within the range of these features. The photograph shows the machine in operation, and the sketch shows the arrangement of several of the working parts. While the machine cannot readily be duplicated, it offers suggestions for the building of other novel combination machines of pick-up materials. The lathe and emery wheel are shown in the foreground of the photograph; the scroll-saw table is tilted upward, back of the emery wheel, and the circular-saw table is shown in the background. The large wheel of the bicycle was mounted in the frame, and supported on the floor by hangers at the pedal shaft and pipe connections at the rear brace, as shown in the sketch. The lower part of the wheel runs in a pit in the floor. The power is transmitted from the pedal shaft to a countershaft, by means of a round rope belt, running in the tire groove of the large wheel, over an idler, and engaging a 9-in. grooved pulley, set on the middle of the countershaft. Two of the small rear wheels used on this type of bicycle are mounted on the ends of the countershaft, and drums built over them, to carry the necessary belts for the lathe, emery wheel, and other tools.



An Old-Fashioned High-Wheeler Bicycle was Rigged Up to Provide the Driving Gear for This Combination Machine; the Operator is Ripping Stock on the Circular-Saw Attachment



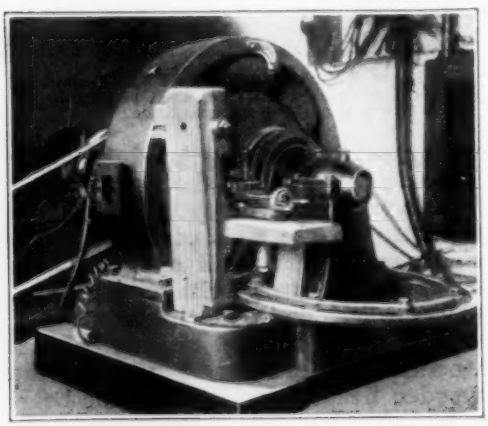
Side Elevation of the Machine, Showing Several of the Working Features, and the Driving Mechanism

The lathe bed is mounted on a wooden platform, and carries the wooden headstock, in which the bearings and spindle are mounted, as indicated. These were made from the bearings and shaft of the bicycle. The tailstock of the lathe is not shown, as it is moved back on the bed, behind the circular-saw table, when the latter is in use. The emery wheel is mounted on an iron stand, which is hinged to fold back toward the countershaft, when the scroll saw is in use.

The scroll saw is mounted in the usual type of wooden arms, and the saw table for it, together with these arms, folds upward, as shown in the photograph. When in use, the front end rests on the lathe bed, and power is transmitted to the arms from the lathe spindle, a lever giving a stroke of 2 in. The circular-saw table is shown at the farther end of the lathe bed, and is folded upward, similar to the scroll-saw table, when not in use. The free end of the table rests on the lathe bed, and is supported firmly. The rip and crosscut saws, and the molding cutters, are mounted on the circular-saw spindle, which is driven directly from the farther end of the countershaft by a pulley and belt.

Motor Commutator Turned Up True in Position

The commutator of a motor became badly worn, requiring truing up. In making the repair, the brush yoke was removed, slipped over the bearing, and laid down, as shown. A piece of timber, fitted with another piece which



The Commutator was Turned True Quickly with This Arrangement, and the Motor was Out of Commission Only a Short Time, Because It Was Not Necessary to Take Down the Machine

acted as a knee, on which was fastened a tool rest, was bolted to the motor. The tool rest and slide fixture used were taken from a small speed lathe. This provided a movement for the feed of the tool and the depth of cut. The rigging was fastened firmly, to prevent vibration and consequent roughening of the surface cut. The armature was driven by another motor connected to it by a belt. One side of the commutator may be harder than the other, and so care must be taken when moving the tool across the soft parts to prevent it from digging in.—Harvey Mead, Scranton, Pa.

Rubber Goods Kept Pliable by Oil

Soft-rubber apparatus deteriorates comparatively rapidly, and a method of preserving it sometimes used by surgeons is to inclose the rubber articles in a tight receptacle, in the bottom of which a small quantity of kerosene oil is permitted to evaporate. A large tin box, or can, with a close-fitting lid makes a good container. Perforated trays are fitted into it to hold the rubber goods. The bottom tray should be several inches above the oil, about two teaspoonfuls of oil being required. The oil must not come in contact with the rubber, which must, of course, be given a thorough washing before use, if sanitation is a requirement.

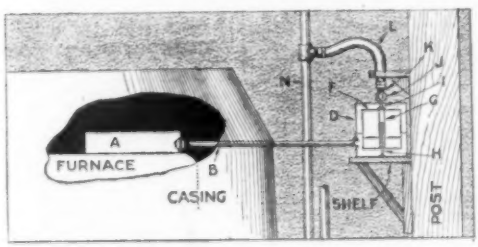
Automatic Feed-Water Pan for Furnaces

Most hot-air furnaces are equipped with a water pan placed usually at the front, or side, in the narrow space between the outside casing and the fire chamber. Such a pan is commonly filled only when the overbaked smell from the dry pan gives tardy notice of the need of attention. The following description of a thoroughly satisfactory, automatically filled pan devised for a hot-air furnace is suggestive as to further means of accomplishing the same purpose.

The pan A, which need not be large, was placed where a sufficient volume of water could be evaporated, on top of the fire box. The heat might melt soldered joints, so a seamless drum, a container of white lead, was used. A hole

was punched through the side, near the bottom and fitted with a horizontal length of ½-in. pipe, B, long enough to extend through the sheet-iron casing of the furnace, a distance of about 2 ft., to a wooden post, as shown. On this post, a shelf was placed to hold a paint can, D, to which the other end of the 1-in. pipe was attached, also near the bottom. Within this can, a float, F, was devised, in the form of an inverted cup, open at the bottom, and guided by a central tube, G, fitted over a vertical wire, H, soldered to the bottom of the can. To the top of the float was attached a needle stem, I, about 2 in. long, serving as a valve stem for the control of the water supply.

A water connection was made by a short length of garden hose, L, as shown. The valve J consisted of a thin sheet of copper soldered over the



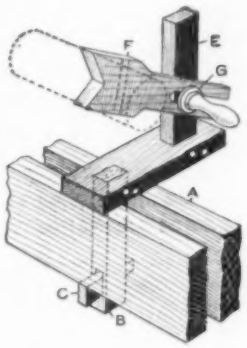
This Arrangement Automatically Keeps the Humidifying Water Tank of the Furnace Filled to the Proper Level, and Insures Healthful Moisture in the Rooms Heated

end of a hose coupling, connected to a nipple, K. A small hole was made in the copper disk, and the needle point entering this hole made a self-guiding valve. The evaporation of the water in the hot-air chamber of the furnace lowers the water level, causing the float to descend and let in water from the hose until the float is raised again, and the water shut off. The regulation of the water supply thus becomes automatic.—B. H. G., Chicago, Ill.

¶A careful operator will not carry developer over to the fixing bath on his hands, or bring them into contact with the developer, until after washing them thoroughly, if any of the fixing bath has come into contact with them.

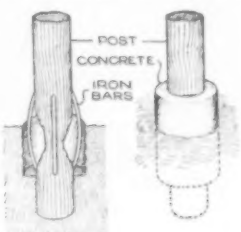
Back Rest for Supporting Wood in Lathe

In turning a long piece upon an ordinary wood-turning lathe, one or more back rests, or supports, may be necessary to control the vibration. The device shown in the sketch was found efficient, and can be made easily. The piece B passes between the shears A of the lathe, and is held in place by a wedge, C, space being left to allow the wedge to pull. The top end of the piece B is mortised and pinned into the base, and the standard E, mortised and pinned. The front end of the arm F is V-shaped. The other end of the arm is slotted to permit lateral adjustment. The screw G, and the hole in the upright E, are threaded, and arranged to hold the arm in place. In use, the V of the arm should be kept waxed with paraffin, so that the spindle will turn easily without scratching, and the rest should be centered over the stock carefully.



Renewing Wooden Posts with Concrete

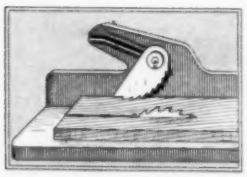
Wooden posts, supporting fences, signs, or buildings generally, decay at the ground line. It is not always possible to renew them without disturbing the structure they support, and besides, if the timber is sound except at the one point, there is a needless waste of lumber if they are discarded. To renew the life of such a post it is only necessary to remove the dirt for 6 in.



around the post. Next a wooden or sheet-metal form is made, and concrete poured in the form around the post, reinforced with iron bars, to a level with the top of the form. After the concrete has set, the post is stronger and less likely to decay farther than before the treatment.—K. M. Coggeshall, Webster Groves, Mo.

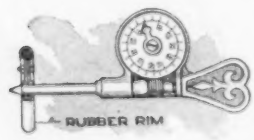
Safety Circular-Saw Guard Prevents Back Thrust

The old saying "never monkey with a buzz saw" is as sound as ever, and the careful mechanic will provide his circular saw with a guard which can be homemade, as shown. Make two steel plates, as detailed, and grind or file teeth into them on the curved edge. Drill the plates for screws and fasten them to a wooden core, permitting the toothed edge to project slightly. Various ways of clamping the guard on the saw-table fence can be devised. The dangerous back thrust of stock being cut is overcome by this guard.—L. J. Young, Cape Porpoise, Maine.



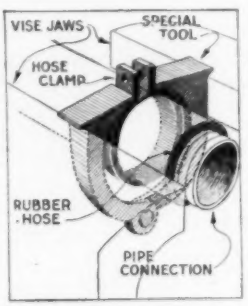
Revolution Counter Rigged to Determine Lineal Travel on Machinery

It is often desirable to know the speed a belt is traveling, or the rate of surface travel of a piece of metal being cut in a machine tool. These speeds can be easily calculated if the diameter of the surfaces and the revolutions per minute are known, but often it is inconvenient to measure one or both of them. Most machine shops and engine rooms possess a revolution counter of the type shown. A wheel, exactly $1\frac{15}{16}$ in. in outside diameter, with a rubber rim, was made as shown, to slip onto the counter in place of the pointer. This diameter is calculated so closely that it gives very accurate results. The revolutions per minute, as indicated by the counter, are timed by a watch. To obtain the distance travel of the surface in feet per minute, divide the revolutions per minute of the counter wheel by 2, which gives the number of feet per minute of surface travel, the circumference of the counter wheel being very close to 6 inches.—R. L. Hervey, Washington, D. C.



Tool for Applying Hose Clamps Handily in Vise

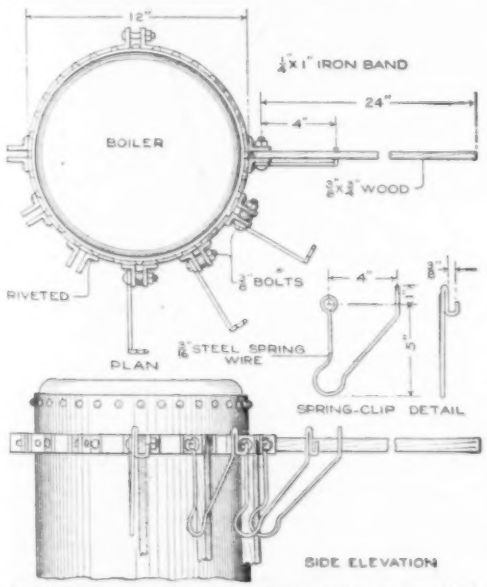
The operation of putting a clamp on a rubber hose at a connection is sometimes difficult, especially if it is an extra-tight fit and the bolt accompanying the clamp is a trifle short. In a shop where the application of clamps on hose, for the purpose of splicing, is part of the daily routine, a tool was made which simplifies the operation. The device, as shown in the illustration, is U-shaped, hinged at the bottom, and large enough to accommodate hose from 1 to 4 in. in diameter. It may be forged with but little trouble. In applying a clamp to the hose, the tool is applied so that its jaws grip the ends of the clamps, and the whole is placed in a vise. By gradually closing the vise jaws, the ends of the clamp are brought together, and a connection made easily and quickly.—L. Schoolcraft, Chicago, Ill.



¶In stenciling around the corner of the wall, use two stencils, one for straight work and the other to bend around the corner, as the bending injures the stencil.

Clothes Drier Attached to Kitchen Boiler

Men in the household usually object to the stringing of wash lines across the kitchen, and the home mechanic who is willing to do a little work to do away with this nuisance, can provide for a considerable quantity of clothes to be dried by arranging a drier around the kitchen boiler. The heat from the boiler reduces considerably the time necessary to dry the clothes. The device should be set near the top of the tank, as shown. It consists of a band-iron ring, which is split at one side and drawn tightly around the boiler by means of a bolt. Small angles, bent from similar band iron, hold the wooden strips on which the clothes are hung. A novel feature of these supports is the spring-clip device, shown in detail, which supports the strips when used. When not in use, the strips can be folded down, out of the way, against the side of the tank. The spring clips are bolted beside the left

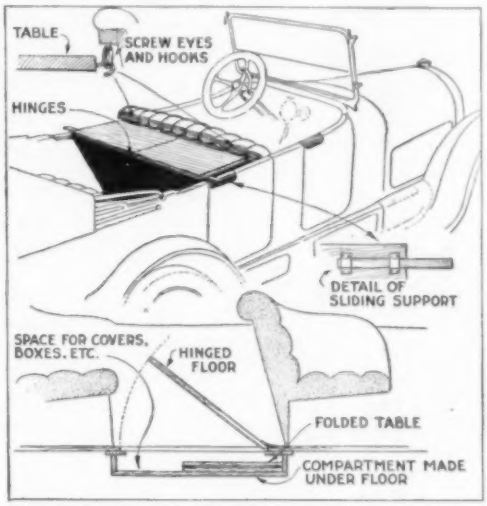


Quick Drying of Clothes in the Kitchen is Provided For by This Practical Arrangement, Which Permits the Wooden Strips to be Folded Down When Not in Use

angle of each pair of angles, which support the wooden strips bolted between them.—P. P. Avery, Garfield, N. J.

Folding Table, Robe Rack, and Extra Compartment in Automobile

An ingenious method of construction and manner of stowing a folding table, and other details of luncheon equip-



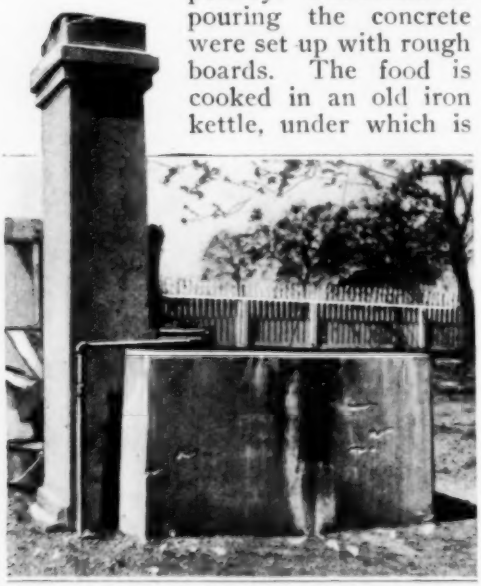
The Table Is a Handy Feature, and When Folded is Stowed Away with Other Articles in the Floor Compartment

ment, is used by the owner of a light five-passenger car. The table consists of two nearly square boards, secured together by two strap hinges on the under side. Two metal slides and two screw hooks are provided for setting it up in the rear of the car, as shown. At the rear of the upper edge of the front seat, two screw eyes are secured. A leather strap through them serves as a robe rack. The hooks on the edge of the table are placed through these screw eyes, and the slides are extended, resting on the doors. The slides are wooden strips set in sheet-metal straps, fastened to the under side of the table.

Under the rear floor of the car is a shallow container, and the floor boards have been cut out and fastened together to form a cover. The compartment accommodates the table when folded, and also other materials. The preference for eating in the car arose because of insects and other annoyances, when the luncheon is spread upon the ground.—G. A. Luers, Washington, D. C.

A Farm Feed and Water Heater of Concrete

An ingenious farmer made a handy cooker for cooking feed for stock and poultry. The forms for pouring the concrete were set up with rough boards. The food is cooked in an old iron kettle, under which is

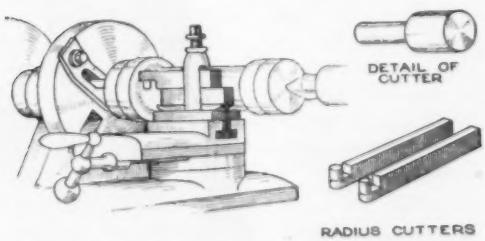


This Concrete Outdoor Farm Cooking Stove can be Made Handily with Simple Forms

provided a place for a fire connecting with the chimney. The water is supplied by the pipe shown at the left. The device is thoroughly practical, and one that any farmer can build in spare time at small cost, as a permanent farm improvement.

Adaptable Tool for Machining Circular Curves on Lathe

Considerable lathe work involving circular corners and grooves was done in a machine shop, and this made it worth while to design and make a set of radius cutters of standard sizes, by which the curves could be cut quickly and uniformly. The cutters were turned up in various sizes, ranging upward from $\frac{3}{32}$ in., made of tool steel, as shown in the detailed sketch. They were set in shanks of steel to fit the tool post. In use, the cutters were set in the tool post upside down, as shown; the drive belt was reversed, and plenty of oil was applied to the cutter. An accurate, smooth job resulted when the feed was carefully regulated.—Ben Frantzreb, Indianapolis, Ind.



Smooth, Circular Curves were Cut in Turned Work on the Lathe by Means of Adaptable Cutters Made in Several Standard Sizes

Fitting Gasoline-Motor Piston Rings Accurately

One of the most common causes of a lack in power of an engine is poor compression, the result of poorly fitting valves or leaky piston rings. First, there is much difference between fitting in and putting in piston rings. A method of fitting the rings, that has been found highly satisfactory, is here described.

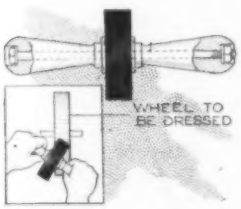
The ring, as it comes from the factory, should be a trifle oversize. First fit the ring to the cylinder, and then to the piston. A wooden piston is made, slightly smaller than the cylinder. To the end of this wooden plug, the piston ring is fastened by a strip of wood held in place by a screw. The ring should be held loosely. The inside of the cylinder is next coated with Prussian blue, then the wooden piston and ring are inserted, and moved back and forth a few times. Upon removing the ring, the high spots on the ring are bright, while the low spots are colored. The high spots on the ring should be filed down carefully, or polished off with emery cloth. After a few trials, the ring can usually be made to fit the cylinder all the way around. Attention must be given to the joint in the ring. A very small clearance, $\frac{1}{64}$ in. often being sufficient, should be left at the joint to allow for expansion from the heat.

The ring is then ready to be fitted to

the piston. The ring should be turned around in the groove, and if it binds, it should be smoothed off. To smooth off the sides of the ring it should be rubbed across emery cloth laid flat on a board, shifting it during the process. It frequently happens that an engine does not have as good compression after new rings have been put in without proper care. Proper fitting of the rings will make a surprising difference in the efficiency and power of a motor.—B. F. Bell, Waverly, Neb.

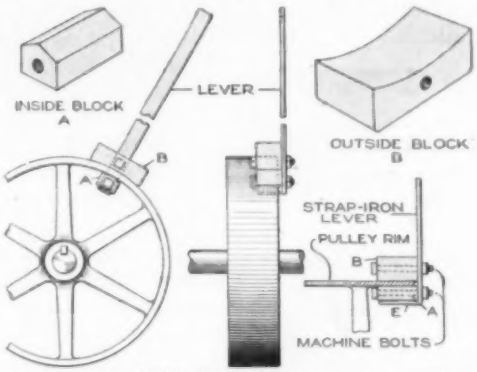
Emery-Wheel Dresser Made of Old Emery Wheel

For dressing down emery wheels, a small worn-out emery wheel is useful, when properly mounted. Set the small wheel on a large bolt, provided with two handles, as shown. Place two large washers between the wheel proper and the handles, which are held by nuts, with washers, at the ends to give slight play. In use, the small wheel is held against the wheel to be dressed, at an angle, and the handles are forced together to slow up the dressing wheel, and produce a grinding effect.—Thomas W. Benson, Hastings-upon-Hudson, N. Y.



Pulley Lever That does Not Damage Rims

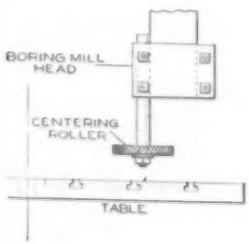
In the maintenance of machinery and mechanical power-transmission equipment, it is frequently necessary to turn a pulley, which is mounted on a shaft or machine, through a revolution or fraction thereof, to reset it. When a lever is required, monkey wrenches are often used, with a piece of pipe slipped over the handle. This method sometimes breaks pieces from the rims of the pulleys. A pulley-starting lever, which will not break the rims, can be made as detailed in Fig. 1. With this lever the stress on the pulley rim is distributed over a wide area. For best results, a different-size outside block, B, should be made for pulleys varying considerably in diameter. The blocks A and B may be made of cast or wrought iron, or even of hard wood. The lever is of strap iron, and the blocks are held to it with machine bolts.—R. C. Farrell, Chicago, Ill.



By the Use of This Lever Arrangement the Rims are Not Nicked in Resetting Pulleys

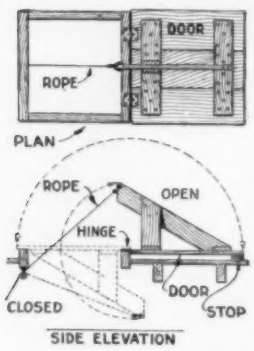
Device for Centering Work on Boring Mills

The centering of round work on a vertical boring mill is easily accomplished with the use of the roller centering device shown in the sketch. The casting is placed on the table, not bolted down, and the table run slowly, and, as the wheel on the centering device is loose, the casting is centered by moving the head horizontally until the wheel runs against the casting all the way around. Centering work on a boring mill is usually done with the aid of the cutting tool, which often results in damage to the work, but with the use of the roller there is no liability of damage from this source.—J. R. Minter, Washington, Ind.



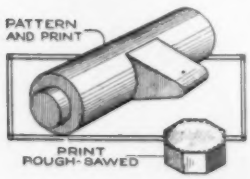
Ventilating Door on Roof Opened from Ground

A novel door made for the roof of a silo, in place of the usual type of ventilating door, and which can be opened from the ground by means of a rope threaded through pulleys, has numerous other applications. The door is hinged in the usual manner, and a wooden bracket built on its inner side, as shown. The rope is tied at the upper corner of the bracket, when the door is opened and resting on its stop on the roof. By drawing on the rope, the door is raised sufficiently so that its weight acts as a counterbalance, closing it. To open the door, the rope is also pulled, until the door is carried past the point of balance, when it again carries itself to the open position by its own weight. If the door is a heavy one, counterweights and bumping pads should be arranged for it.—L. A. Knutsen, Everett, Wash.



Simple Method of Making Core Prints without Lathe

It is customary with patternmakers to turn core prints integral with the patterns themselves. At times, however, the separate print is preferred. Also, some patternmakers have no power tools besides a saw and a sand wheel. Then prints can be easily and as quickly made as in a lathe by rough-sawing the block, as shown, and sanding it down to the scribed circle. A scribed circle on the pattern locates the print.—Donald A. Hampson, Middletown, New York.

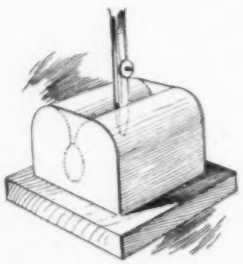


Pile of Rods Protected by Painted Stripe

A practical method of detecting if pieces have been taken from a pile of pipe, tubing, or bar stock, as often is the case especially where the material is stored in vacant lots or in shop yards, is to paint a bright-colored stripe over the pile. If pieces are taken from the pile, there will be a break in the colored stripe. This aids in placing the responsibility quickly, and cuts down the unauthorized use or theft of stock. —C. C. Spreen, Flint, Mich.

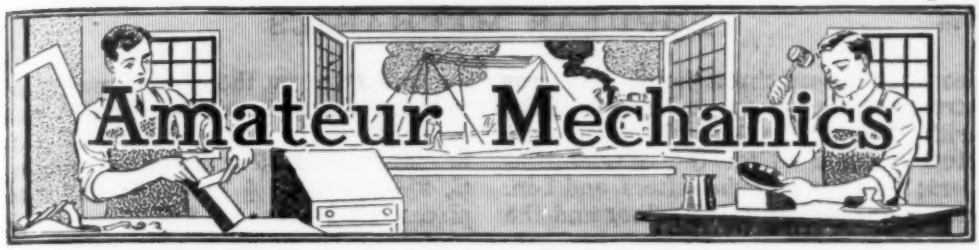
Block for Starting Flow of Ink in Ruling Pen

The ink in a ruling pen often refuses to flow, and in order to avoid the common practice of touching the point on the finger, I made a block that does the work nicely. To make it, drill a ½-in. hole in the end of a 1¾ by 1½-in. block of wood, as shown. Cut a curved slot from the top into the hole, rounding off the corners smoothly. Glue pieces of cardboard over the ends and provide a base. When the pen is contrary, push the point through the slot, and the ink is released. The block can easily be cut to fit pens of various sizes.—Walter Whitley, Lawrence, Mass.



Cleaning Glass Chemical Containers

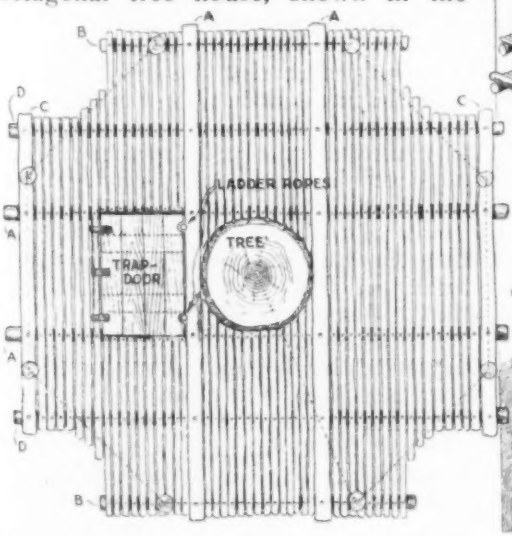
Graduates, reagent bottles, and similar vessels used for chemicals, should be cleaned thoroughly before refilling them, especially if a new liquid is used. A good cleansing agent is vinegar into which a quantity of coal dust has been poured. Fill the vessel about one-third full and shake it vigorously until the interior is polished clean. Wash the vessel in clear water, preferably distilled.

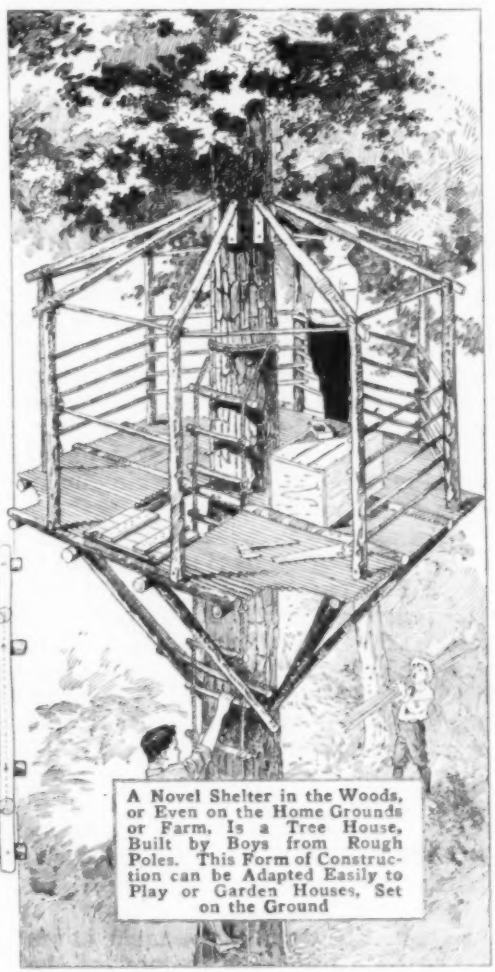


A Tree Hut and Rustic Shelter of Poles and Brushwood

By EDWARD A. KRUEGER

IRRESISTIBLE is the lure of autumn's days to the woodsman, young or old, calling him forth over a carpet of fallen leaves, to roam or hunt, with a companion or two, in the quiet of the woods. As if in anticipation of winter's rigors, it is the season for the building of a rustic hut, a shelter from the elements. For the younger woodsmen, at least, this becomes a romantic retreat, a storied scout's camp of older days, or a secret rendezvous of warring Indians, perhaps. A novel woods shelter of unusual construction, that boys can build with only a few tools, is a tree hut of timber poles and brushwood. It may be supported by a single large tree, or by two or more trees. In the latter case, the framework may be built around the trees, or between them, depending on their relative position. The octagonal tree house, shown in the sketch, is strongly framed. The joints are bolted, or spiked, together, and the weight is carried by the main-floor beams, firmly braced against the tree trunk. Round poles and brush sticks, as they are gathered or cut in the





A Novel Shelter in the Woods, or Even on the Home Grounds or Farm, Is a Tree House, Built by Boys from Rough Poles. This Form of Construction can be Adapted Easily to Play or Garden Houses, Set on the Ground

woods, are used throughout. The construction can, of course, be carried out with standard mill stock, 2 by 4-in. stuff being used for the heavier timbers; 2 by 2-in., for the rafters, and 1-in. strips and boards, for the floor and the smaller braces.

The same general method of framing, omitting unnecessary features, can be adapted to an octagonal hut built around the base of a tree. On clear ground, where no central support is available, the roof rafters can be braced around a short section of timber, about 6 in. in diameter. The ground framing may consist only of sills, extending around the octagonal outline, with or without a floor. Built on the ground, a structure of this type can serve as a rustic garden shelter, as a children's playhouse, or even for the more common purpose of a storage shed.

The dimensions of the framing may vary, within safe limits, and the sizes suggested are suitable for a tree about 2 ft. in diameter. The octagon, on which the framing for the floor is laid out, as shown in the plan, has a 4-ft. radius. This is a safe maximum for the type of construction shown, for if the main timbers are made longer, it is difficult to support them properly from a single tree trunk. To make the main framework for the floor, cut four poles, A, 3 in. in diameter and 8 ft. long, as scaled from the plan. To obtain dimensions from the plan readily, make a strip of paper, 1 in. wide and as long as the heavy floor supports. Divide this length into eight parts, each of which will represent 1 ft. on the construction. If the tree is of uniform diameter, near the ground and at the point where the floor frame is supported, the frame may be bolted together firmly on the ground, and hoisted into place. Otherwise, it should be fitted together on the ground, and not bolted finally until in place. The timbers are supported by four blocks, nailed to the trunk at the point where the frame is to be set. It is further held in place by spikes.

If bolts are used at the main joints of the frame, the pieces may all be cut and fitted on the ground, and then raised and put into place finally, one at a time. Cut two pieces, B, 2½ in. in diameter and 5 ft. long; two pieces, C, 2½ in. by 5½ ft. long; and two pieces, D, 2½ in. by 8 ft. long. The pieces D are bolted under the pieces C, and two of the pieces A are set slightly nearer the other pieces A, than the pieces B. When the main frame is in place, brace it from the trunk, the notches for the ends of the braces being cut into two of the pieces A, 8 in. from their ends, on the ground. The corresponding ends of the braces are sharpened to a wedge to fit them, and spiked into place. The braces that are notched into two of the pieces A are parallel, as shown, their lower ends being spiked to the sides of the trunk. The two braces on each of the other two braced sides are not parallel. They are notched into the pieces B, and spiked, at the notches and at the junction with the trunk, just above the parallel braces.

The climbing ladder, of rope and short sections of 1½-in. poles, can be made on the ground and hoisted into place. It is spread from the trunk at the top and at intervals by short sticks, spiked to the trunk. The ladder is arranged so that it can be drawn up into the house, if desired. The floor of the platform is made of poles, 1½ to 2 in. in diameter, arranged across the timbers, as shown, and nailed in place. It is important that the poles for the floor be extended well beyond the beams, as indicated, so that no long, free ends of the poles project. The trapdoor is made of 1-in. lumber, braced with two cleats. It is hinged on strips of leather, and arranged so that its ends rest on the adjoining beams A. It is shown closed, in the plan, and open, in the sketch.

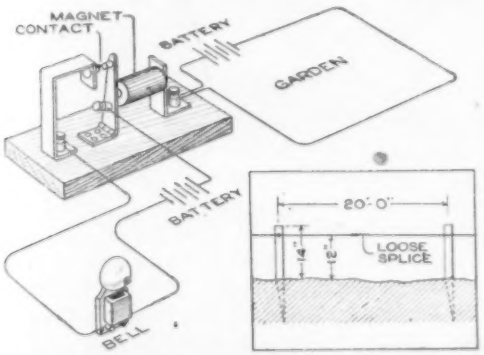
The sides and roof of the house are supported by 2½-in. poles, for studding, and 2-in. poles, for the rafters. They are cut on the ground, and the joints at the eaves halved, and bolted, or spiked, as shown. The upper ends of the rafters are set on wooden strips, nailed to the trunk at a uniform height,

and spiked in place. The studding and rafters are braced with smaller poles, extending around the octagon at the top, and around the inside, as a guard against the occupants of the house falling out.

The tree hut can be covered in various ways. To carry out the rustic effect completely, the roof and sides may be thatched with twigs and brush. If the house is used only during fairly moderate weather, a latticework of small poles is satisfactory, and a canvas roof may be used. The sides may also be covered with canvas, and the entire structure may be boarded over, leaving, in each case, sufficient openings for light.

Bell Alarm Warns of Garden Intruders

Being troubled with garden thieves, I rigged the device shown in the sketch to prevent further depredations. Small copper wire was placed on stakes around the garden, and the two terminals led into the house, and connected to the small electromagnet. The bell connections being made, the apparatus works as follows: When the circuit around the garden is closed, the magnet holds the contact points apart, and the bell does not ring. Breaking the wire, or pulling it apart between any two of the small stakes, opens the magnet circuit and allows the contact points to come together, thereby closing the bell circuit and causing the bell to ring, warning those in the house of the presence of intruders.—H. R. Post, Los Angeles, Calif.



When Intruders in the Garden Break the Wire Circuit at Any of the Loose Joints, a Warning Bell Rings in the House

¶In laying a large rug, sweep from the center toward the edges of it, removing the air and leaving the rug smooth.

Folding Camp Stove with Large Hinges as Legs

Makeshift camp stoves are nearly as numerous as campers, but here is a homemade arrangement that will give good service, folds compactly, and is made of materials that nearly every camper can get. Narrow 10-in. strap hinges are used for the legs. The frame is made of ¼ by 1-in. iron strips, bolted together with $\frac{3}{16}$-in. bolts. Wire mesh is fastened over the frame, which is hinged at the center, the hinges being set so that they will not collapse under the weight of the cooking utensils. Small chains may be fitted to the legs to steady them, but pressing the ends of the hinges into the ground is usually sufficient.—P. P. Avery, Garfield, N. J.

This Practical Camp Stove Folds Up Compactly and is Made of Materials Easily Obtained

Tablecloths Kept on Rollers in Drawer

A neat and economical, as well as a space-saving, method of keeping tablecloths is to roll them on curtain rollers set in a drawer. Creasing or folding of the cloths is largely eliminated, which

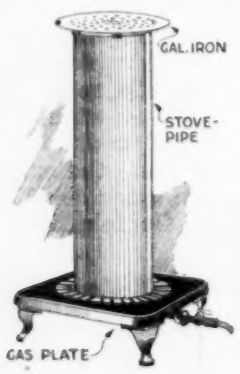
adds to their appearance when in use, as well as saving wear. An ordinary deep drawer is used. Several shade rollers, the size and strength deter-

The Tablecloths are Rolled Up in the Drawer on Shade Rollers, Avoiding Much Folding and Wear

mined by the number of cloths to be rolled upon them, are set into it. If placed in position at an angle of about 45°, as indicated, three or four rollers can be placed in one drawer, allowing, also, room in the front part of drawer for napkins and other table linen. The cover is folded once, and one end placed under spring clips, A, and wound up, as in operating a shade roller.—A. A. Mack, Chicago, Ill.

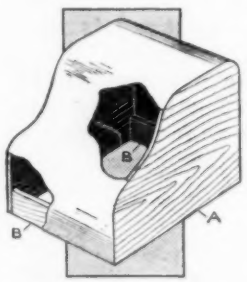
Gas Heater Made of Stovepipe

Finding the bathroom uncomfortable in chilly weather, I made a heater out of an old section of stovepipe and a small gas plate, which proved effective. A galvanized-iron plate was fitted to the top of the pipe with four small strips of band iron, arranged to catch on the top edge, as shown. Holes were punched through the iron, and additional draft was afforded by the space under the cover. The lower end of the pipe was slit 2 in. from the end, and the resulting strips bent outward at a right angle, to form a wider base for the pipe. Some of the strips were fastened to the webbed top of the gas plate, to prevent the stovepipe from tipping over easily. Proper ventilation should, of course, be maintained to insure against the danger of exhausting the oxygen in the room.—Charles Rorer, Bridgeport, Conn.



Substantial Typewriter Cover Made of Wood and Cardboard

A typewriter cover that will keep out the dust better than the average rubber, or oilcloth, cover can easily be made out of a few thin boards and a large sheet of heavy cardboard. The shape and size of the cover will, of course, depend upon the kind of machine to be housed, and the illustration shows the common form. The sides A of the cover are made of two ⅜-in. boards. The front and back pieces B are made of similar strips, 3 in. wide. The latter pieces are nailed between the sidepieces, as shown. The cardboard is cut to the proper width and length to fully cover the front, top, and back of the framework. Dampen the cardboard with a wet sponge, so that it will conform to the curves of the wooden sides. Using small flat-headed tacks, fasten it along the edges. When the top is tacked, and all rough edges trimmed off, heavy paper, or strong cloth, should be glued over the cover to make a smooth job, and cover the tack heads, after which a coat of paint or varnish may be applied to make the cover match the desk.—Frank L. Matter, Portland, Ore.



¶A small metal, or wooden, ball fixed to the end tines of a rake will prevent it from injuring a lawn.

Hitting the Bull's-Eye With the Pistol

by Stillman Taylor

SPORTSMEN should become familiar with the revolver and pistol, as well as with the rifle and shotgun, notwithstanding the same expertness is more difficult of accomplishment in the case of the one-hand weapon. There is no secret or mystery about skill with such an arm; and any person with average vision and strength will be able to shoot well after systematic practice.

The selection of the weapon is important. The novice should begin his practice with a .22-caliber arm, because of the small expense, and the slight

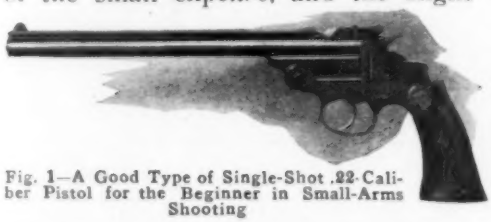


Fig. 1—A Good Type of Single-Shot .22-Caliber Pistol for the Beginner in Small-Arms Shooting

recoil, as well. The beginner is inclined to close the eyes and flinch at the moment of pulling the trigger. This is fatal to good shooting, and is encouraged by the loud report and heavy recoil of the large-caliber arms. Better progress can therefore be made with a light-caliber weapon. The .22-caliber is useful also for indoor shooting, and such practice may be had if proper provision is made. In buying an arm, a single-shot pistol with an 8-in. barrel is a good choice. A good type of single-shot pistol, adapted for .22 short and .22 long, rifle cartridges, is shown in Fig. 1.

If the sportsman prefers to begin with a "six-shooter," a good choice is a .22 revolver with 6-in. barrel, with square target-grip stock and fitted with adjustable open target sights, as shown in Fig. 2. A revolver of the heavy-frame type, with swing-out cylinder, is a common choice of discriminating expert revolver marksmen. In selecting

Fig. 2—A .22-Caliber Target-Grip Stock Revolver, Fitted with Adjustable Target Sights

a suitable heavier weapon, after considerable skill has been acquired, the calibers mostly used are the .32, .38, .44, and .45, the .38, as shown in Fig. 3, being the general choice for target or snap-shooting.

The balance of the revolver should be well considered. The grip and balance should be such that the barrel will fall in line with the mark without making it necessary for the shooter to crook his wrist. The barrel should fall in line with the eye as easily as the index finger is pointed at an object.

In the choice of sights, the shooter has a wide range of selection, each

Fig. 3—A Heavy Frame, .38-Caliber "Six Shooter," a Favorite with the Expert Revolver Marksman

choice having its skillful advocates. For a front sight, the several forms of bead sights are preferred by many good

marksmen. Bead sights may be fitted to any standard make of revolver or pistol, and may be obtained in many sizes. The rear sight is best provided with screw adjustment for windage, and the notch should be in the form of a shallow "U," or semicircle. A good

Fig. 4—Revolver Sights: Adjustable Rear Sight; Adjustable Rear and Front Bead Sights, in Alinement, and a Bead Front Sight

form of sight is the combination shown in Fig. 4.

In order to become a practical shot, it is necessary that the shooter grip the weapon correctly, and also acquire the knack of holding the sight on the mark. If the revolver is fitted with a well-designed stock, the shooter's hand will so conform to the contour of the butt that the weapon is held firmly without tenseness of the muscles, and with the middle finger resting upon the frame just back of the trigger, as shown in Fig. 5. This position is a great aid to good shooting.

The first, and most important, step in good revolver marksmanship is to learn how to hold the sight and press the trigger. For quickly training arm, hand, and eye to act in unison, there is

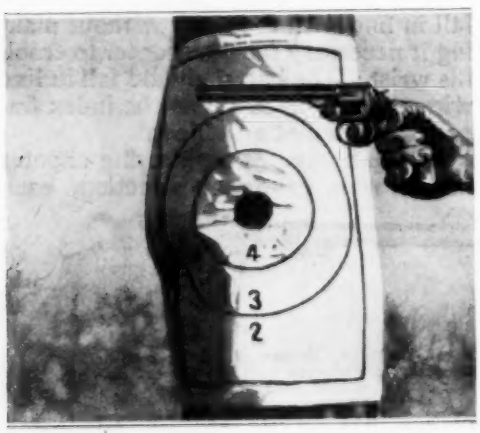


Fig. 5—The Revolver is Held Firmly, without Tenseness, the Middle Finger Resting Just Back of the Trigger Frame

no better method than the silent aiming drill. This preliminary practice may be done in a room, by pinning to the wall a target, or square of white paper, in the center of which a black, circular ¾-in. disk is pasted. Pin the target with the bull's-eye on a level with the eyes, and take a position about 15 ft. distant, with empty weapon in hand. Extend the arm naturally, and, as soon as the sights are in line with the mark, squeeze the trigger by closing the whole hand upon the grip. The aim should be held on the bull's-eye after the hammer has fallen, to enable one to note whether the muzzle is thrown up, or to the right or left of the mark, upon the impact of the hammer. In conducting this drill, the novice should assume an easy standing position, with the left, or free, hand hanging straight down and close to the side. The correct position is shown in Figs. 6 and 7. However, when the hand is inclined to be unsteady, the left hand may rest upon the hip, or grip the thigh. The trigger is squeezed, or pressed, straight back, not pulled by the finger alone. The novice will find it an aid to bring up the revolver with a light grip, and gradually close the hand as the sights are brought into line, when the hammer will fall without jerking the muzzle from the mark.

Another important point that must be observed is to keep the rear sight level, and not canted to one side. This is a common error with beginners, and is the chief reason for shooting off to one side. To prevent injury to the mainspring, it is a good plan to fill the chambers of the cylinders with empty shells, and let the soft copper heads absorb the jar of the falling hammer.

In practicing the aiming drill, as well as when shooting at the mark, the revolver should be cocked with the thumb. After a week or two of practice at the dummy target, the shooter may begin by shooting at a 4-in. bull's-eye, at 20 ft., and as soon as almost every shot can be placed in the 4-in. bull's-eye, he may rightly consider himself a fair revolver shot.

Having become skillful in punching

Figs. 6 and 7—The Novice Should Assume an Easy Standing Position, the Left Hand Close to the Side, and Practice the Silent Aiming Drill

holes in the large target, the shooter is now prepared to practice his gun play at a smaller fixed target, and for this purpose the regulation targets should be used. Each target is a record, on which should be noted the score and such other details as distance, date, and sequence of shots. These targets should be preserved, so that the marksman may correct his mistakes.

The standard American target has been adopted by the majority of revolver clubs, and shooting should be confined to this system of scoring, because it enables the marksman to compare his own shooting with the scores made by others. The standard target, in its original dimensions, is used for rifle, revolver, and pistol practice, and is made up for the several regulation ranges. For 100-yd. rifle and 50-yd. revolver practice the bull's-eye is 8 in. in diameter. The regulation indoor revolver range is 20 yd., and for this distance the bull's-eye is reduced to 2¾ in. in diameter. For 10-yd. ranges, the bull's-eye is 1 in. in diameter. In counting a score made on this target, the bullet touching a line of any circle is counted as the next higher ring, and the marksman is always given the benefit of any doubtful shots. The same targets may be used over and over again by pasting over the holes. A more economical way is to make the targets by copying the sample targets, and drawing the concentric rings with a pair of compasses. The black bull's-eye may be made with pigment, or a circular disk of black paper may be pasted on.

Now that the shooter is to try his skill at a fine mark, the details of sighting the arm must be considered. In adjusting the sights of a revolver for all ordinary shooting, it is more satisfactory to aline the sights for the distance usually shot over. Target sights are, of course, adjustable for different ranges. The rear sight should be so placed that the revolver will land its shots on a vertical line through the center of the bull's-eye. This lateral sighting is done by moving the rear sight in the same direction it is desired to place the bullet. The elevation is secured by raising the rear sight or shortening the front sight, the former being the handiest.

To make it convenient to refer to the shots on the target, the black center, or bull's-eye, has been likened to the face of a clock: The top of the bull's-eye is called twelve o'clock; the bottom, six o'clock; the left side, nine o'clock; the

right side, three o'clock, etc. Now, in taking aim at the target, the sight should be taken just below the bottom edge of the bull's-eye at six o'clock, and a point of white should show between the sight and the bull's-eye. In altering the sights, adjust them so that when the aim is taken at six o'clock the bullet will go in the center of the bull's-eye.

In practicing difficult stationary shots, the marksman must first become

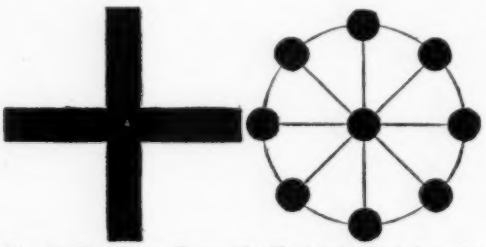


Fig. 8—The Cross Target Is Useful in Training the Shooter to Hold on Center; the Clockface Target Demands Careful Holding, and Affords Variety

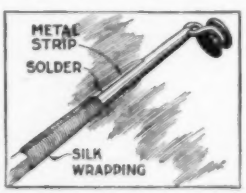
proficient in holding at both vertical and horizontal lines, and for speedily acquiring skill in this branch of revolver work, the following homemade targets are useful: The cross target, shown in Fig. 8, is particularly useful in acquiring the knack of holding on center. The horizontal holding must be correct in order to place the bullet in the narrow vertical strip, while the elevation must be exactly right to shoot within the width of the horizontal arm. The clockface target, Fig. 8, is an agreeable change from the other forms, and demands good holding to place the shots in the circular centers. For a beginning, the shooter should not make the mistake of shooting at too small a mark, and the cross and clockface targets should be drawn on a fairly large scale, 1-in. strips or spots being satisfactory.

To become a good all-around shot, practice should not be confined to fine target shooting, but a balance struck by using the revolver in snap-shooting at moving objects. At first, the best practice is that obtained by suspending a common rubber ball to a length of string, and endeavoring to hit the sphere as it swings back and forth like a pendulum. To be seen clearly, the ball should be painted black and suspended in front of a square of white paper tacked to the backstop. In snap-shooting, the aim is never taken directly at the object, but allowance is made for the rate of movement. There are three important factors to keep in mind: the distance from shooter to mark, the rate or speed of movement, and the angle which is shot over. In short, the shooter must calculate to aim, not where the object is, but where it will be when the bullet reaches it. Hence the actual aim is taken at an imaginary spot just inside the arc made by the swinging ball, and while the ball is farthest to the right or left. The shot must be made quickly, or it will be too late.

If the target is thrown up, the lead must be above, and under, when shooting at a descending object. If the target is moving to the left and descending, hold ahead and under the mark, etc. The tendency is to shoot over rather than under a mark. After the marksman becomes expert in hitting the swinging ball, he may try his hand at objects thrown in the air. The usual precautions of wiping and oiling firearms lightly are necessary to keep revolvers and pistols clean and in the best shape.

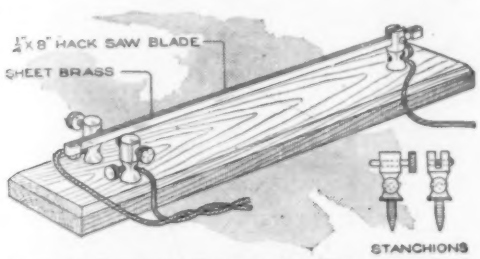
Reinforcing Loose Fishpole Tips

Sometimes the tip on a fishing rod slips off, due to the cracking of the cement. If a thin strip of metal is soldered on the outside of the ferrule, it can be easily fastened to the rod by winding silk thread around the strip and the rod, just below the ferrule, as indicated. This also strengthens the tip of the rod where it often breaks off. The strip can also be made longer to strengthen a longer portion of the rod.—E. W. Werner, Ann Arbor, Mich.



Electric Temperature Regulator for Brooder

A large brooder for young turkeys gave much trouble, overheating or getting too cold, so I made a device, which indicates when the heat increases or decreases greatly by ringing a doorbell in my room. I put together a piece of steel from an old hack-saw blade and a piece of sheet brass the same width, but ½ in. shorter, and bent the extra ½ in. of the steel over the brass on the ends, and soldered them together. Next I made three stanchions, and sawed a slot in one, into which the long piece of brass was fitted, with a small screw. The parts were assembled on a board, as shown. When the heat increases, the brass strip expands rapidly, and bends, making a connection on one of

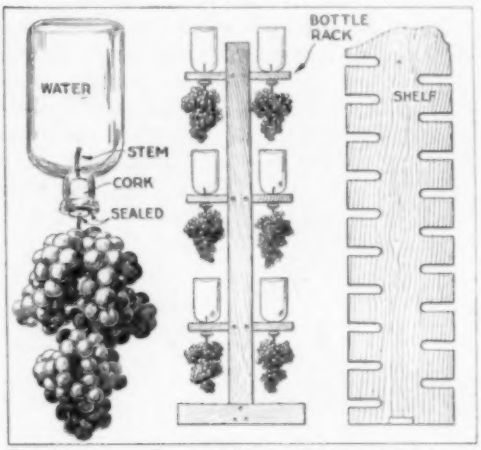


When the Incubator Becomes Too Hot or Too Cold, the Strip is Bent Toward One of the Binding Posts, and the Bell is Rung at a Distance

the stanchions, and ringing the bell in my room. When the heat decreases, the brass contracts rapidly, and bends the strip the other way, making a connection on the other stanchion. The difference in the expansion and contraction of the two pieces of metal is, of course, responsible for the bending. It can be adjusted to ring at various points, 80° and 76° being satisfactory. —Waller L. Kaufmann, Santa Ana, California.

Water Fed to Grapes from Bottles Keeps Them Fresh

A simple and inexpensive method by which grapes can be kept fresh for several months after picking, is as follows: Select bunches of grapes that have stems 2 or 3 in. long. Obtain medium-sized glass bottles, one for each bunch of grapes, and fit each bottle with a

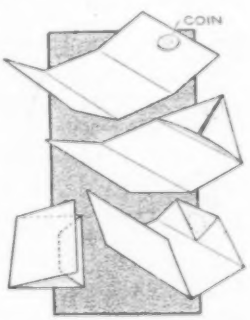


The Stems are Inserted in the Bottles, Which are Filled with Water and Supported from the Rack

cork stopper. Through each stopper bore a hole to admit the stem of a bunch of grapes, as shown. Fill the bottles with water, and invert them. Place them in a cool, dark place, preferably on a rack, as indicated. If the stem does not fit into the hole tightly, pour melted paraffin around the hole. A little chloride of lime in the storeroom will absorb excess moisture from the atmosphere.—E. P. Sullivan, Arlington, Mass.

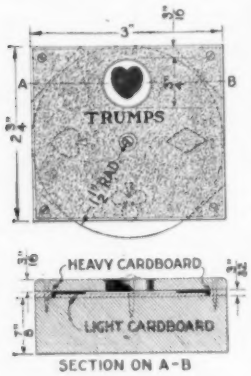
Coin Mailer Folded from Sheet of Paper

A convenient method of mailing a coin—large or small—so that it will not slide about, is shown in the sketch. A sheet of ordinary letter paper is used, making it unnecessary to cut cardboard, or other material, as is usual in such devices. The coin is folded into the sheet, the various stages in the process being indicated in the sketch.—James M. Kane, Doylestown, Pa.



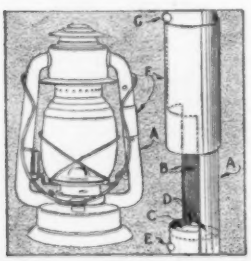
A Revolving Trump Indicator for Card Games

In many card games it is desirable to have an indicator on the table showing the trump, and the device shown in the illustration serves this purpose. It was made of wood and cardboard, and the card symbols were cut from an old pack of cards and mounted on the revolving cardboard disk. The base is a block of wood, 7/8 by 2¾ by 3 in. in size. Cardboard triangles are pasted on it at the four corners. In the center, the dial is mounted, which is 1½ in. in radius. The symbols are pasted on the dial, and a cover of heavy cardboard is fastened over the dial with screws. A hole through the cardboard exposes the trump indication.—A. G. Lange, Chicago, Ill.



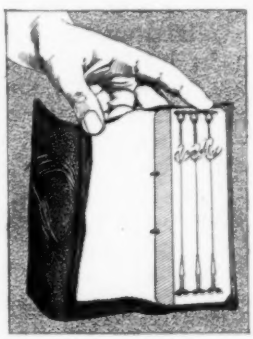
Match Safe Cut in Frame of Lantern

A lantern without a match is an unpleasant but quite common experience, and the arrangement shown in the sketch provides for the keeping of matches in a safe cut into the frame of the lantern, without materially weakening it. Two horizontal cuts are made into the frame of the lantern, halfway through, and the cut portion is bent in against the opposite side, at A. The fold B should be at the seam, if the frame has one. A disk, C, is soldered into place with drops of solder, D. A sleeve, F, is fitted closely over the frame and its movement is limited by the stops E and G. The sleeve can be made to slide up or down, depending on the structure of the frame, down being preferable, only the upper third of the match-safe opening being exposed. This is sufficient for filling the match safe or removing matches, and prevents the scattering of matches.—L. D. Obitts, Wellington, Ohio.



A Fisherman's Homemade Fly Book

While trout fishing, I experienced trouble in removing flies from my book, two or three usually getting tangled when pulled out. Finally I made one out of an old leather cover. In place of the celluloid leaf, I used cardboard, glueing linen on the binding edge and giving the whole two coats of spar varnish. Next, I sewed ordinary hooks and eyes to both sides of the cardboard, the eyes at the top, and the hooks at the bottom. I then attached small rubber bands to the eyes, thus keeping the gut taut. One fly can be removed without disturbing the others.—E. E. Buchanan, Jr., Elmira, N. Y.

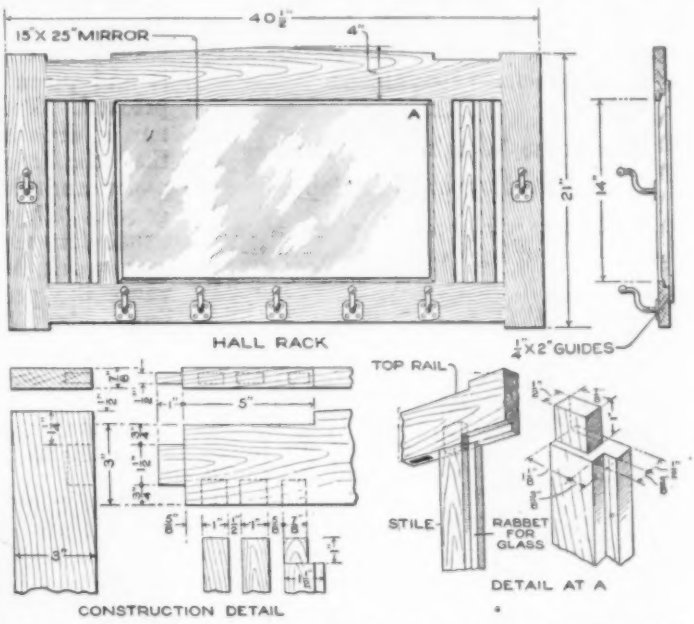


Safe Method of Holding Tacks

A person trying to hold an ordinary tack in the fingers to drive it with a hammer will usually miss the head of the tack and damage his finger, and perhaps his temper. An easier method is to push the tack into the end of a strip of paper, which can be used as a holder without danger to the fingers. If a number of tacks are to be driven, they can be set in the strip one after another, a slight pull on the paper, just before the tack is driven home, releasing the strip.—Merrill B. Folsom, Tonka Bay, Minn.

A Mirror Frame and Hall Rack

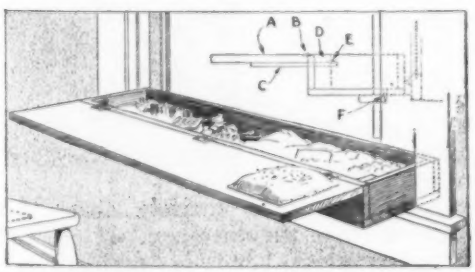
A useful piece of home furniture that can be made by the amateur craftsman is a hall rack provided with a mirror. One of simple design is shown in the illustration, and the parts should be worked out to the dimensions given in order to preserve the pleasing proportions. Hard wood, preferably oak or chestnut, is suitable, and the pieces should be cut so that the best grain of the wood comes to the front. A plain or a beveled mirror may be used, and the more skillful worker may even make the hooks from copper, riveting the screw plates to the bent pieces. Various finishes can be applied, a dark stain and several coats of wax being good.



This Attractive Hall Rack and Mirror Frame can be Made to Match the Furniture in the Home by Reasonably Careful Workmanship

Begin the construction by cutting the pieces to shape, and planing them down to the dimensions indicated. Lay out the joints carefully, as shown in the details. Note that the four spindles are not shouldered but set into mortises their full width and thickness. The shaped portion at the top can best be made after the end joints are fitted. Careful work is required in making the joints at the four corners of the mirror, as shown in the detail. They must be made right and left, and the rabbets for the glass are cut with a chisel or a rabbet plane.

When all the parts are fitted, clean the surfaces with a sharp plane, and glue the joints, clamping them for about 12 hours at least. Remove the excess glue, scrape and sandpaper the surfaces, and place the mirror temporarily, fastening it with the ¼ by 2-in. guides. Remove these pieces and the mirror, and apply the finish. Then set the mirror into place finally, and attach the hooks.—G. W. Bretz, Berwick, Pa.



A Sewing Box Built into the Window Frame Provides for the Sewing Materials, at the Place Where They are Generally Used

Sewing Box Fitted on Window Stool

As the most convenient place for hand sewing, and similar work, is near a window, a sewing box built on the window stool, as shown in the sketch, affords a handy storage place for the sewing material, as well as a worktable. The box is fitted closely between the sides of the frame. It is set back from the sash enough to permit cleaning and handy raising of the sash. The cover

A of the box swings forward on hinges, B, and rests on two ½-in. dowel rods, C, which slide into the blocks D, set in the box at the ends, as detailed, with small round-head screws, E, as stops. The bottom of the box is fastened with screws, F. A pincushion on the lid, and, perhaps, pockets for sewing materials are convenient.

Sawhorse Weighted by Sawyer Standing on Footstep

By placing a small step on a sawhorse, the weight of the sawyer holds it steady, and eliminates the sudden pinching of the saw, due to slight shifting of the horse. The legs of the horse should be made about 8 in. longer than usual, and the step set so as to bring the weight well forward of the extreme point of contact of the legs with the ground.—F. R. Vance, Chicago, Ill.

Silencing the Clapper on a Bell

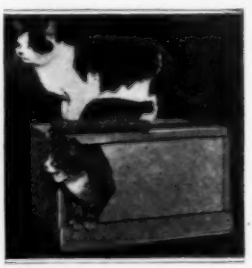
While on a prospecting expedition, I wished to silence the bells on my pack animals without removing the bells from their necks. To do this I cut a piece of heavy leather from an old shoe and fitted it inside of the bell just above the clapper. I then cut a hole in the center, smaller than the clapper, and four slits from it. The leather is quickly pushed over the clapper, silencing it, and can be quickly removed.—E. B. Warren, Garnet, Montana.

Pressing Cloth with Moist-Paper Protection

A practical kink in pressing cloth, which was discovered by the need of a substitute for the usual cloth, is to use paper as a protection. The paper should be clean and strong. Moisten it and place it over the goods to be pressed. Proceed in the usual manner in ironing, and it will be found that the iron moves easily over the paper and that no lint is left on the goods. Dry paper, placed over the usual dampened cloth, also makes the iron work more smoothly, and prevents the pressing cloth from wrinkling.—Mary F. Scott, Albany, N. Y.

An Outdoor "Kennel" for Cats

Auricular evidence proves that even pet cats do considerable prowling at night. However, the pets would be quieter, and more contented, if provided with a suitable place to catch those much-needed "forty winks" in the wee hours of the morning. The photographs show the construction of a retreat for "kitty," made by converting a soap box into a cat's palace. Hinges of leather permit the box to be opened for cleaning, or airing, or on warm nights. A catch prevents the door from opening, should the inmates kick in their sleep. A curtain of sacking over the entrance gives protection on exceptionally cold nights. This curtain must not entirely close the lower part of the entrance. If the cat is conservative, her feline majesty can be fed in the new domicile until it becomes an old story.



Homemade Apparatus for Drying Fruits and Vegetables

ECONOMY in fruits and vegetables can be effected by drying them in the sun. In its simplest form such drying consists in spreading the freshly prepared slices or pieces on clean muslin, held down with stones. Bright, hot sunny days are chosen for this work, and a close watch is kept to see that no rain or dew wets the product. A mosquito bar is thrown over the produce, and once or twice a day the slices are stirred and the thin ones, which dry first, are taken out. Fruits and vegetables, when dried in the sun, generally are spread on large trays of uniform size, as shown in Fig. 1, the design for these and other apparatus described being taken from data prepared by the Department of Agriculture. They can be stacked and protected from rain by means of a suitable cover. A cheap tray can be made of strips of lumber,

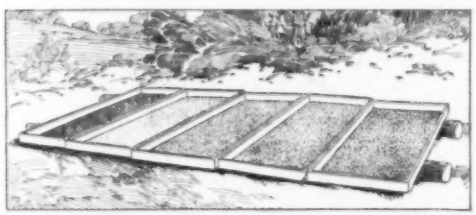


Fig. 1—The Fruit is Spread on the Trays, Protected by Mosquito Netting, and Permitted to Dry in the Sun

¾ in. thick and 2 in. wide, which form the sides and ends, and lath, spaced ⅛ in. apart, to form the bottom. Screen, ⅛ or ¼-in. mesh, can also be used.

A drier for use over the kitchen stove can be made of galvanized-wire netting and strips of wood, about ½ in. thick and 2 in. wide, as shown in Fig. 2. This drier can be suspended over the kitchen range, or over an oil, gasoline, or gas stove, and utilizes the hot air which rises while cooking is being done. It can be raised out of the way or swung to one side by a crane made of lath, when the stove is required for cooking.

Another cookstove drier, that can be used on a wood or coal range or a kerosene stove, is shown in Fig. 3. Its dimensions are: base, 24 by 16 in.; height, 36 in. The base, 6 in. high, is made of galvanized sheet iron. It has two small openings for ventilation in each of the four sides. The boxlike

Fig. 2—This Multiple-Deck Tray Arrangement Utilizes the Waste Heat from the Stove, and can be Swung Aside When in the Way for Cooking

frame is made of 1 or 1½-in. strips of wood. The trays in the drier rest on cleats, placed at intervals of 3 in. The

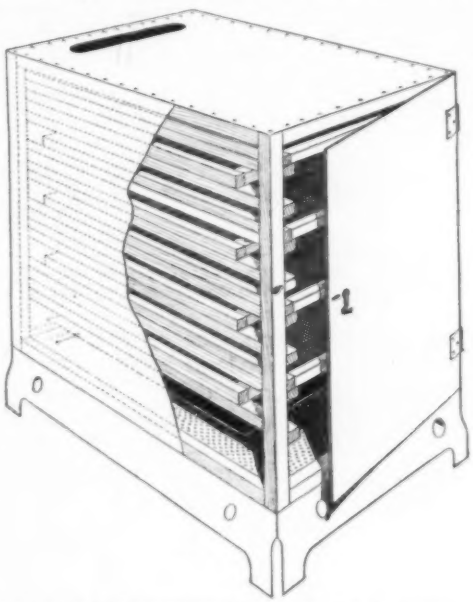


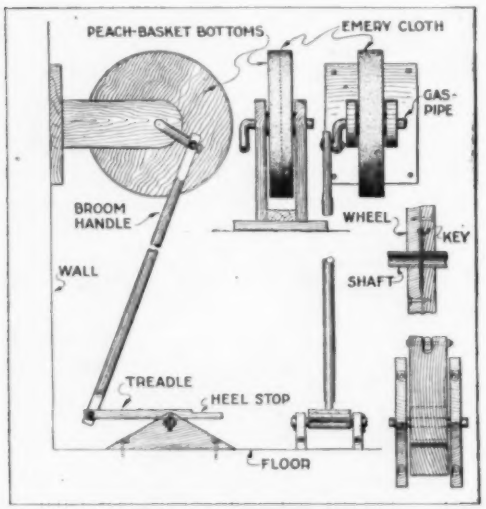
Fig. 3—Eight Trays are Housed in This Substantial Drier of Sheet Metal, Which is Set Directly on the Stove

frame is covered with tin, or galvanized sheet iron. The bottom of the drier is

made of perforated galvanized sheet iron. Two inches above the bottom is placed a solid sheet of galvanized iron which is 3 in. less in length and width than the bottom. This sheet rests on two wires fastened to the sides of the drier, which prevents the direct heat from coming in contact with the product. The drier holds eight trays. The frame of the tray is made of 1-in. strips on which is tacked galvanized screen wire, which forms the bottom. The tray is 21 by 15 in. long. The trays alternate, one being flush with the front, and the next 3 in. back. This permits the current of heated air to pass around and over the trays. A ventilator opening, about 2 in. wide and 6 in. long, is left in the top of the drier, through which the moist air may pass.

Foot-Power Emery Grinder Quickly Made

Desiring quickly a simple and inexpensive emery wheel for the finishing of plates and grinding of tools in

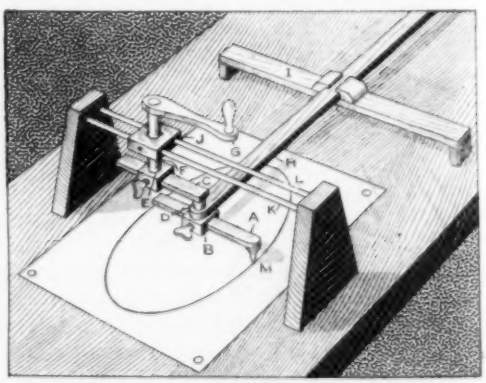


This Emery Grinder Proved so Handy in a Diesinker's Shop That One was Made for Home Use

a diesinker's shop, one as shown was made from materials at hand. The gas pipe was bent and drilled, a nail inserted, and the disks placed upon the ends of the pipe and screwed together. A coat of glue fastens the emery cloth to the wheel. A nail through one end of the broom handle was riveted into the bent end of the wheel pivot. The treadle is fastened similarly. The treadle brackets support a short section of pipe, fastened to the treadle. The supporting bracket is fastened to the wall by screws, or expansion bolts.—Frank A. Gould, Washington, D. C.

Machine for Drawing Ellipses

When properly set and operated, the machine shown in the sketch will draw ellipses of dimensions up to the limit determined by the size of the machine, which can be made to suit individual needs. The construction is simple, and the main constructive features are as follows: The arm A is mounted in a grooved block, B, which is rigidly attached to the arm C by means of the circular shaft D. The arm C is mounted in the grooved block E, attached firmly to the shaft F, with the handle G mounted on its upper end. The shaft D passes through an opening in the horizontal piece H, and this piece is mounted on two supports, one of which is shown at I, so that it can move endwise only. The shaft F passes through an opening in the block J, which is mounted on two stiff dowel rods, K and L, so that it can move along these rods only. It must be observed that the block J moves in a path at right angles

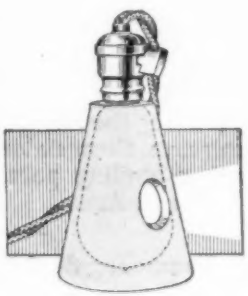


The Machine is Set According to the Desired Major and Minor Axes of the Ellipse, and the Figure Drawn Precisely

to the path in which the piece H moves. If the center of the shaft D were placed directly beneath the center of the shaft F, and the handle rotated, the tracing point M would mark out a circle, having a radius equal to the distance between the end of the tracing point and the center of the shaft D. If the center of the shaft D be moved to one side of the center of the shaft F, as shown in the figure, the path of the tracing point will not be a circle, but an ellipse, as indicated. The dimensions of this ellipse will depend upon the adjustment of the two arms A and C. The distance across the ellipse will be equal to twice the distance from the center of the shaft D to the center of the tracing point, and the distance from end to end will be equal to twice the distance from the center of the shaft F to the center of the tracing point.—M. P. Norton, Chicago, Ill.

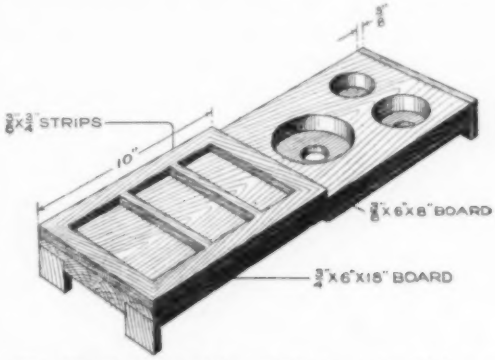
Electric Bulb Used as Spot Light

A convenient and inexpensive spot light to be used in a dark room for developing pictures, or in the sick room, can be provided by slipping over an electric globe, the strawboard container that the globe is incased in when purchased. A suitable hole is cut into the cardboard, as shown. By turning the strawboard container around the globe, the spotlight may be placed in any desired direction.—Roy H. Poston, Flat River, Missouri.



Holder for Kitchen-Sink Accessories

Considerable time is saved daily in our kitchen, and disagreeable work made less so, by the use of a small tray for holding the various cleaning agents used at the sink. Soaps, powders, brushes, scraper, etc., are here assembled, drained, and kept off the sink board. The tray is made as follows: Cut a ¾-in. board 10 by 18 in. long; with ⅜ by ¾-in. strips, make a shallow frame, as shown, at one end of the board, for soap bars. In the other end of the board, bore holes to accommodate cans of cleaning material, and other articles needed. Cover the under side of this end with a thin board, and through it, in each hole, bore a ¾-in. hole for drainage, and similarly, in each compartment in the soap frame. Nail four small legs to the corners. Putty the nail holes, and apply two coats of linseed oil to the device.—Henry Simon, Laguna Beach, Calif.



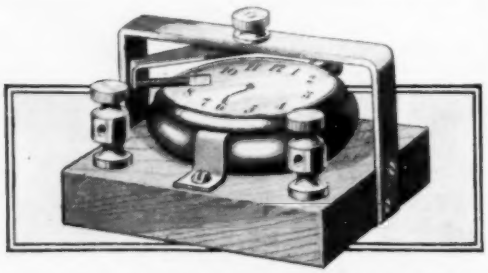
The Cleaning Materials and Tools at the Sink are Cared for Properly by the Use of This Holder

Cloth Polishing Brushes Made from Bristle Brushes

Being in need of a furniture polisher, I made one that worked very well in the following manner: I removed the handle from a worn-out stove brush, and then cut a strip of heavy Brussels carpet, twice as long as the brush. The bristles were bent over, and the strip of carpet was drawn over the brush part, as shown, and fastened with screws.—Dale R. Van Horn, Milton, Wisconsin.

A Time Switch Fitted to a Dollar Watch

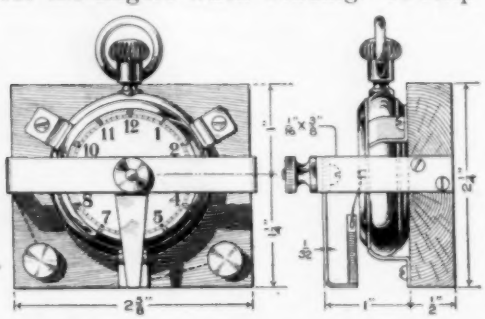
One who has not made the experiment is likely to doubt the statement that a 16-cp. carbon-filament lamp can be lighted through a single copper wire,



This Dollar-Watch Time Switch Arouses the Sleeper and Turns on Current for Heating His Shaving Water

.005 in. in diameter, without overheating it. An ordinary dry cell will burn up a short length of such a wire, but the half ampere under 110 volts requires little metal to accommodate it. It was this fact that led to experimenting with the ordinary dollar watch to actuate a time switch. Such a switch has been used to turn on the light at arising time during the winter season, and also to turn on the current in a shaving-water heater.

The device is arranged as follows: First procure the watch and build the mechanism to suit it. A hardwood block is used as a base, and three metal brackets hold the watch to the base, as shown. Screw these down so that the stem winder will project beyond the edge of the base to allow ample room for the fingers when winding. A strip



The Watch is Clamped on the Base and Electrical Connections Made as Indicated

of sheet brass forms the bridge across the top. Drill this for screws at each end, as indicated in the diagram, and at the exact center, for the brass bolt of an old dry cell. The regulating arm is then shaped, drilled at the large end, and bent down at the other. This piece holds the spring that intercepts and makes contact with the hour hand of the watch. While a very small strip of extremely thin metal will answer, a more even and delicate pressure may be had by winding fine brass spring wire into a close coil, about $\frac{3}{32}$ in. in diameter, and use this coil as a flat spring. Solder one end to the regulating arm, and a small piece of brass to the other end. A closer timing may be had by tipping it with platinum. Two binding posts are set on the base, one connected with the bridge, and the other to one of the base brackets. Remove the glass, and bend the minute hand well up out of the way, or remove it, and raise the tip of the hour hand slightly. Attach the bridge, and see that the regulating arm swings freely in a complete circle, at any point of which it may be clamped.

The action is apparent: The ½-ampere alternating current flows through the watch, without harming it, along the hour hand to the regulating arm, thence along the bridge to the other binding post.—John D. Adams, Phoenix, Ariz.

Enameling Spokes and Worn Rims of Motorcycle

Scratched rims, and rusty spokes and hubs, detract from the appearance of a motorcycle. Old rims and rusty spokes may be made more attractive by enameling them black or white, preferably the latter. The enamel should be removed from the rims with a knife and sandpaper, and all oil and grease removed from the spokes and hubs with gasoline. The rim, spokes, and hubs are then given a coat of primer. The second coat should be a glossy enamel, and, if properly done, the wheels will resemble the wire wheels on some automobiles. Wheels

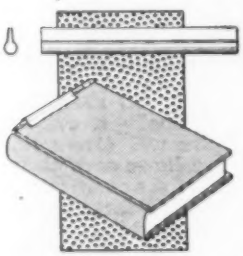
thus treated are practically rustproof, and whenever it becomes necessary to clean them, a sponge and water, with a little "elbow grease," will do the work effectively.—Francis W. Nunenmacher, Berkeley, Calif.

Uniform Photo-Bath Temperature Prevents Blisters

A common difficulty encountered by the amateur photographer is the blistering of plates or prints. This is usually ascribed to hot weather. The real cause is the difference in temperature between the atmosphere and the developing baths. In summer atmosphere the wash water and toning bath are of uniform but high temperature. The fresh hypo bath becomes cold because of the fall in temperature when hypo is dissolved in water. When the prints are plunged into the cold bath, after being in the warmer one, blisters frequently result. In winter, similar difficulties may be met with if one of the baths is much colder than the other. The remedy lies in testing the temperatures and making them uniform.

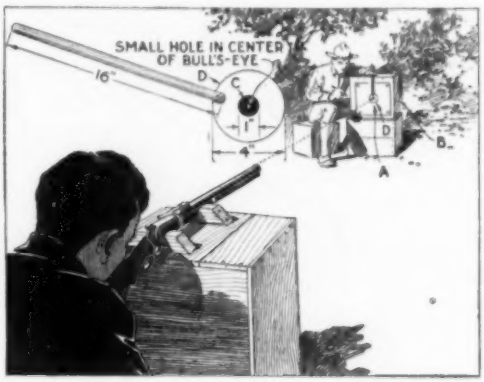
Handy Removable Pencil Clip Attached to Blank Book

It is necessary in our office to make switching orders in triplicate for each car that goes from the plant. To fumble in the pocket, or look for a copying pencil, is annoying, so a holder for the copying pencil was made, keeping it with the book in which the manifold copying is to be done. A piece of light tin, with an opening just large enough to receive the pencil, is slipped on the upper edge of the book, and after making the copies, the pencil is shoved into the holder. When a book is emptied, the holder is transferred to the new book. —A. C. Gandy, West Lafayette, Ind.



Target Arrangement for Rifle-Sighting Practice

Excellent sighting practice with a rifle may be had by securing the rifle firmly in a vise, or rack, and sighting



The Novice Sights the Rifle and the Marker Indicates on the Target the Accuracy of the Aim

it repeatedly at an object placed 20 or 25 ft. away. A similar system is used in the army to accustom men to sighting properly. The sketch shows the rifle secured in notches cut in blocks set on a box, and trained on the target. This is shown in the detail, where A is a square of white paper, secured to a box, B, by thumb tacks. The bull's-eye C is a black circle, 1 in. in diameter, with a small hole in the center. D is a round piece of cardboard, 4 in. in diameter, attached to a wooden handle, 16 in. long.

In sighting practice, a person holds the bull's-eye on the target and moves it at the directions of the rifleman until it is in the position at which the rifleman would pull the trigger. The rifleman then orders "mark," and the marker makes a dot on the target by putting the point of a pencil through the hole in the center of the bull's-eye. Three "shots" are allowed each time, and, with fair marksmanship, they should hit within ½ in. of each other. Neither the rifle nor the target are moved during the shots, the bull's-eye only being moved to line up with the rifleman's sight.—George M. Petersen, Watertown, N. Y.

November
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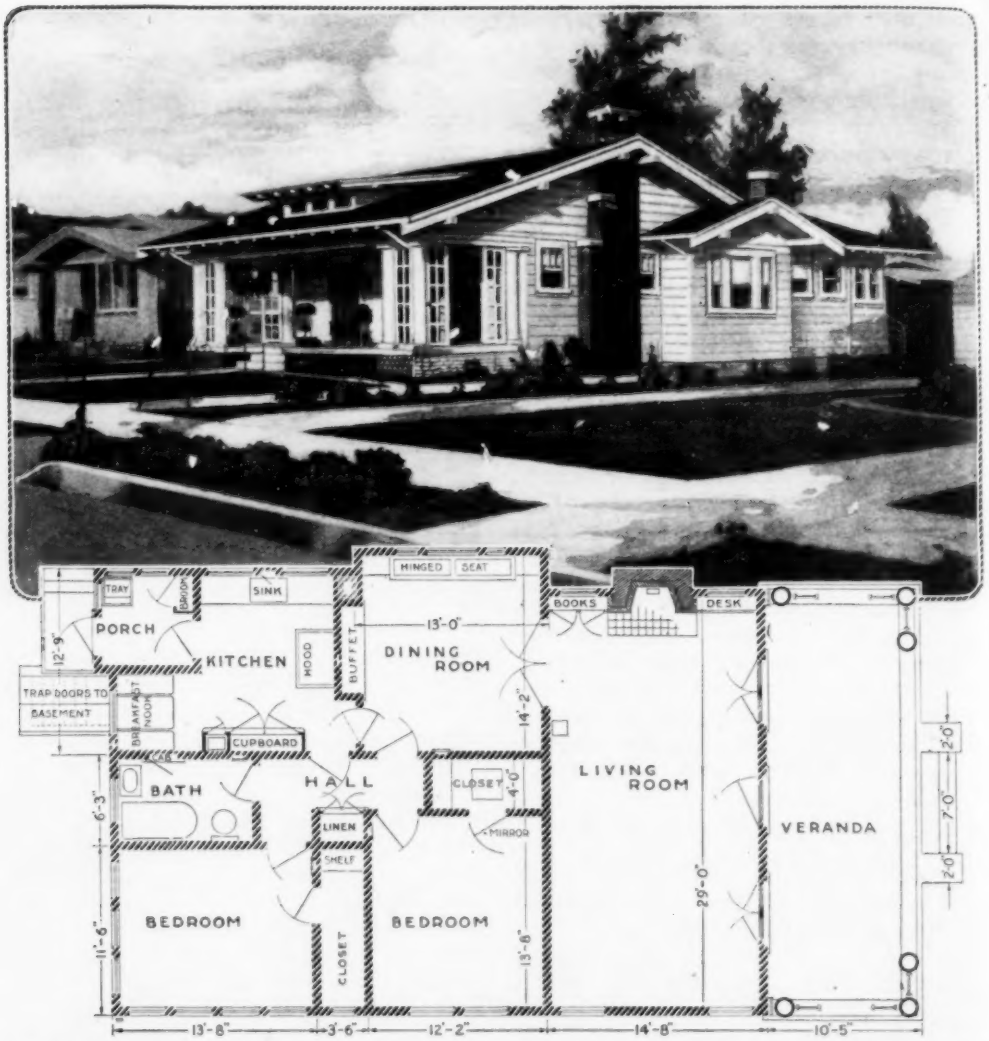
CHARMING BUNGALOW FOR SMALL FAMILY



FOR the small family of modest requirements, the picturesque little bungalow illustrated herewith may spell "home." The interior arrangement has the virtue of being as convenient as the outside architecture is attractive. A glance at the floor plan will stress this point. The rooms are all of comfortable size, while the living room is really an exceptional one for a small dwelling. Furthermore, it will be observed that in spite of the overhanging roof and broad veranda, sunlight is not excluded, for French windows glaze a large part of the front wall. The architecture is a modification of the Colonial style that during the past two or three years has become increasingly popular in southern California. Except for the green-shingled roof and the brickwork, the exterior is entirely white. White-enameled pine is used throughout for the inside finish and all the floors are of quarter-sawed oak except those in the kitchen and toilet. The big fireplace has a French-gray mantel of Colonial design, which adds much to the coziness of the living room. A hot-air furnace is installed in the basement. The bungalow has been erected for $3,850. This price includes the heating plant.

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